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For related information see also *Astronautics*.

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For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **290**

89 ASTRONOMY **305**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **308**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **312**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **316**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **316**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **317**

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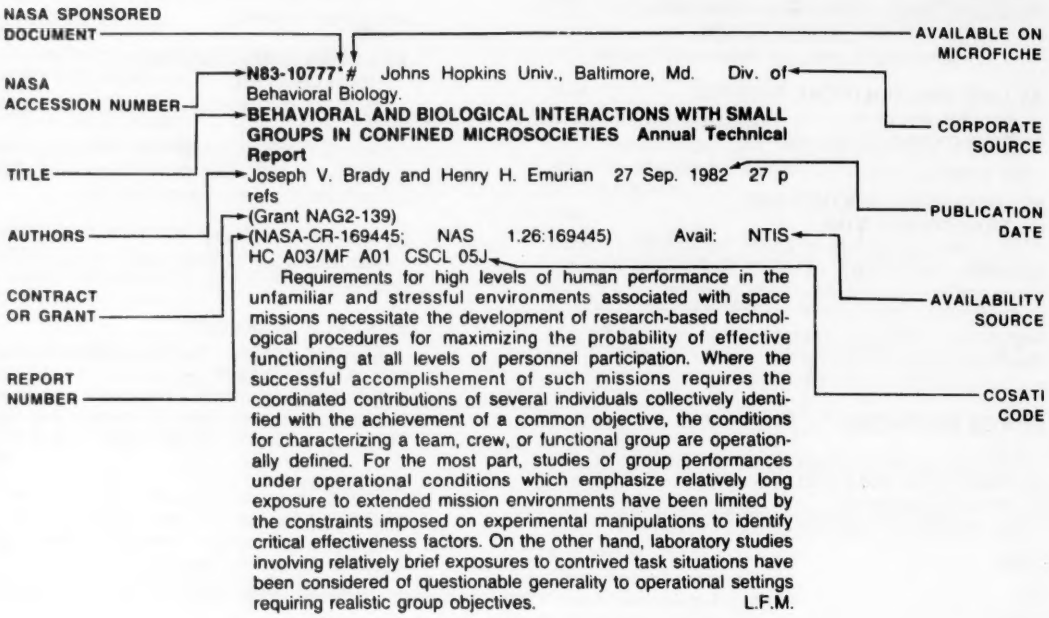
TYPICAL CITATION AND ABSTRACT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N83-10777* # Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
CORPORATE SOURCE
TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
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Joseph V. Brady and Henry H. Emurian 27 Sep. 1982 27 p refs
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COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N83-11018*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF SOME EFFECTS OF HUMIDITY ON AERODYNAMIC CHARACTERISTICS ON A 10-PERCENT-THICK NASA SUPERCRITICAL AIRFOIL
Frank L. Jordan, Jr. Mar. 1976 69 p refs
(NASA-TM-X-3355; L-10606; NAS 1.15:X-3355) Avail: NTIS HC A04/MF A01 CSCL 01B

An investigation was conducted in the Langley 8-foot transonic pressure tunnel to determine the effects of wind-tunnel humidity on the aerodynamic characteristics of a 10-percent-thick NASA supercritical airfoil. Effects of dewpoint variation from 267 K (20 F) to 294 K (70 F) were investigated. The tunnel stagnation temperature was 322 K (120 F) and the stagnation pressure was 0.1013 MN/09 m (1 atm). B.W.

N83-11019*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF EFFECTS OF UNDERWING LEADING-EDGE VORTEX GENERATORS OF A SUPERCRITICAL-WING RESEARCH AIRPLANE CONFIGURATION
Charles D. Harris and Dennis W. Bartlett Apr. 1972 223 p refs
(NASA-TM-X-2471; L-8049; NAS 1.15:X-2471) Avail: NTIS HC A10/MF A01 CSCL 01B

Effects of underwing leading-edge vortex generators on the longitudinal stability and performance characteristics and on the aerodynamic load distribution of an area-rule research airplane model with a NASA supercritical wing are presented. The fundamental flow mechanism to which the effects are related is recognized and discussed. Author

N83-11020*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF EFFECTS OF REAR UPPER SURFACE MODIFICATION ON A NASA SUPERCRITICAL AIRFOIL
Charles D. Harris and James A. Blackwell, Jr. Jan. 1972 53 p refs
(NASA-TM-X-2454; L-7983; NAS 1.15:X-2454) Avail: NTIS HC A04/MF A01 CSCL 01B

Wind tunnel tests were conducted at Mach numbers from 0.60 to 0.81 to examine the effects on supercritical airfoil of modifying the rear upper surface to reduce the magnitude of an intermediate off design second velocity peak. The modification was accomplished by increasing the upper surface curvature around the 50 percent chord station and reducing the curvature over approximately the rearmost 30 percent of the airfoil while maintaining the same trailing edge thickness. S.L.

N83-11021*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF WING TRAILING-EDGE TRUNCATION ON AERODYNAMIC CHARACTERISTICS OF A NASA SUPERCRITICAL-WING RESEARCH AIRPLANE MODEL
Dennis W. Bartlett and Charles D. Harris Aug. 1974 106 p refs
(NASA-TM-X-3024; L-9158; NAS 1.15:X-3024) Avail: NTIS HC A06/MF A01 CSCL 01B

The Langley 8-foot transonic pressure tunnel was used at Mach numbers from 0.80 to 1.00 to determine the effects of wing trailing-edge truncation on the aerodynamic characteristics of a 0.0625-scale model of a NASA TF-8A supercritical-wing research airplane. The effects of trailing-edge truncations of 1, 2, and 3 percent of the local streamwise chord on the longitudinal aerodynamic characteristics and the wing section characteristics are presented. A.R.H.

N83-11022*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A 42 DEG SWEPT HIGH-WING MODEL HAVING A DOUBLE-SLOTTED FLAP SYSTEM AND A SUPERCRITICAL AIRFOIL
Paul G. Fournier and Kenneth W. Goodson Aug. 1974 108 p refs
(NASA-TM-X-3036; L-9233; NAS 1.15:X-3036) Avail: NTIS HC A06/MF A01 CSCL 01B

A low-speed investigation was conducted over an angle-of-attack range from about -4 deg to 20 deg in the Langley V/STOL tunnel to determine the effects of a double-slotted flap, high-lift system on the aerodynamic characteristics of a 42 deg swept high-wing model having a supercritical airfoil. The wing had an aspect ratio of 6.78 and a taper ratio of 0.36; the double-slotted flap consisted of a 35-percent-chord flap with a 15-percent-chord vane. The model was tested with a 15-percent-chord leading-edge slat. Author

N83-11023*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC STABILITY CHARACTERISTICS IN PITCH, YAW, AND ROLL OF A SUPERCRITICAL-WING RESEARCH AIRPLANE MODEL
Richmond P. Boyden May 1974 97 p refs
(NASA-TM-X-2900; L-9006; NAS 1.15:X-2900) Avail: NTIS HC A05/MF A01 CSCL 01B

The aerodynamic damping in pitch, yaw, and roll and the oscillatory stability in pitch and yaw of a supercritical-wing research airplane model were determined for Mach numbers of 0.25 to 1.20 by using the small-amplitude forced-oscillation technique. The angle-of-attack range was from -2 deg to 20 deg. The effects of the underwing leading-edge vortex generators and the contributions of the wing, vertical tail, and horizontal tail to the appropriate damping and stability were measured. Author

N83-11024*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY AND CONTROL CHARACTERISTICS: INCLUDING AILERON HINGE MOMENTS OF A MODEL OF A SUPERCRITICAL-WING RESEARCH AIRPLANE

Richard J. Re Apr. 1974 133 p refs
(NASA-TM-X-2929; L-9196; NAS 1.15:X-2929) Avail: NTIS HC A07/MF A01 CSCL 01B

Tests were made in the Langley 16-foot transonic tunnel to determine the longitudinal and lateral stability and control characteristics and aileron hinge moments of a 0.087 scale model of a supercritical-wing research aircraft. Mach number was varied from 0.90 to 1.30 at a Reynolds number of approximately 2.4 million; angle of attack was varied from -8 degrees to 14 degrees; and angle of sideslip was set at about -5.5 degrees, 0 degrees, and 5.5 degrees. Aileron hinge moments were obtained at deflection angles of -15 degrees to 15 degrees. Aileron, horizontal-tail, and rudder effectiveness parameters were determined. Author

N83-11025*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF WING-MOUNTED NACELLES ON A 42 DEG SWEPT SUPERCRITICAL WING CONFIGURATION AT NEAR-SONIC SPEEDS
Linwood W. McKinney, Joseph F. Herman (Ling-Temco-Vought Aerospace Corp.), and Lawrence A. Bodin (Ling-Temco-Vought Aerospace Corp.) Mar. 1974 151 p refs
(NASA-TM-X-2954; L-9267; NAS 1.15:X-2954) Avail: NTIS HC A08/MF A01 CSCL 01B

An investigation was made to assess the effect of wing-mounted nacelles on a supercritical wing configuration at near-sonic Mach numbers. The investigation was made by utilizing the Cornell Aeronautical Laboratory 8-foot transonic tunnel and covered a Mach number range from 0.90 to 0.99. Force data and pressure measurements at selected locations were obtained. The investigation with the nacelles on included the effect of spanwise location of the nacelle (semispan locations of 35 and 70 percent) and the effect of area ruling for the nacelles located at the 35 percent semispan station. Tests were also made with the outboard nacelle extended forward so that it was directly adjacent to the inboard nacelle location. These tests provided a direct assessment of the extent of the nacelle interference flow field in a lateral direction. Author

N83-11026*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF TWO 10-PERCENT-THICK NASA SUPERCRITICAL AIRFOILS WITH DIFFERENT UPPER SURFACE CURVATURE DISTRIBUTIONS
Charles D. Harris Feb. 1974 67 p refs
(NASA-TM-X-2977; L-8522; NAS 1.15:X-2977) Avail: NTIS HC A04/MF A01 CSCL 01B

In order to assess the degree to which the characteristic region of low curvature of the supercritical airfoil can be practically extended on the upper surface, the aerodynamic characteristics of two supercritical airfoils with different upper surface curvature distributions were measured at Mach numbers from 0.60 to 0.81. Integrated section force and moment data, surface pressure distributions, and typical wake survey profiles are presented. Author

N83-11027*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL MEASUREMENTS OF THE CHORDWISE PRESSURE DISTRIBUTION AND PROFILE DRAG OF A RESEARCH AIRPLANE MODEL INCORPORATING A 17-PERCENT-THICK SUPERCRITICAL WING
James C. Ferris Aug. 1973 271 p refs
(NASA-TM-X-2760; L-8730; NAS 1.15:X-2760) Avail: NTIS HC A12/MF A01 CSCL 01B

The Langley 8-foot transonic pressure tunnel to determine the wing chordwise pressure distribution for a 0.09-scale model of a research airplane incorporating a 17-percent-thick supercritical wing. Airfoil profile drag was determined from wake pressure measurements at the 42-percent-semispan wing station. The investigation was conducted at Mach numbers from 0.30 to 0.80 over an angle-of-attack range sufficient to include buffet onset. The Reynolds number based on the mean geometric chord varied from 2 x 10 to the 6th power at Mach number 0.30 to 3.33 x 10 to the 6th power at Mach number 0.65 and was maintained at a constant value of 3.86 x 10 to the 6th power at Mach numbers from 0.70 to 0.80. Pressure coefficients for four wing semispan stations and wing-section normal-force and pitching-moment coefficients for two semispan stations are presented in tabular form over the Mach number range from 0.30 to 0.80. Plotted chordwise pressure distributions and wake profiles are given for a selected range of section normal-force coefficients over the same Mach number range. Author

N83-11028*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A WIND-TUNNEL INVESTIGATION OF THE APPLICATION OF THE NASA SUPERCRITICAL AIRFOIL TO A VARIABLE-WING-SWEEP FIGHTER AIRPLANE
Theodore G. Ayers Jul. 1973 269 p
(NASA-TM-X-2759; L-8689; NAS 1.15:X-2759) Avail: NTIS HC A12/MF A01 CSCL 01B

An investigation was conducted in the Langley 8 foot transonic pressure tunnel and the Langley Unitary Plan wind tunnel to evaluate the effectiveness of three variations of the NASA supercritical airfoil as applied to a model of a variable wing sweep fighter airplane. Wing panels incorporating conventional NACA 64A series airfoil with 0.20 and 0.40 camber were used as bases of reference for this evaluation. Static force and moment measurements were obtained for wing leading edge sweep angles of 26, 33, 39, and 72.5 degrees. Fluctuating wing root bending moment data were obtained at subsonic speeds to determine buffet characteristics. Subsonic data were also obtained for determining the effects of wing transition location and spoiler deflection. Limited lateral directional data are included for the conventional 0.20 cambered wing and the supercritical wing. Author

N83-11029*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION AT NEAR-SONIC SPEED OF SOME EFFECTS OF HUMIDITY ON THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF AN NASA SUPERCRITICAL WING RESEARCH AIRPLANE MODEL
Frank L. Jordan, Jr. Aug. 1972 71 p refs
(NASA-TM-X-2618; L-8220; NAS 1.15:X-2618) Avail: NTIS HC A04/MF A01 CSCL 01B

The Langley 8-foot transonic pressure tunnel was used in an effort to determine the effects of humidity at near-sonic speed on the longitudinal aerodynamic characteristics and wing pressure distributions of an area-rule research airplane model with an NASA supercritical wing. Effects of dewpoint at the normal tunnel operating stagnation temperature of 48.9 C (120 F) and effects of stagnation temperature at a relatively high dewpoint of 15.6 C (60 F) were investigated. The test tunnel stagnation pressure was 101 325 N/sq m (1 atmosphere). Author

N83-11030*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A MODEL HAVING A 42 DEG SWEPT LOW WING WITH A SUPERCRITICAL AIRFOIL, DOUBLE-SLOTTED FLAPS, AND A T-TAIL
Paul G. Fournier and William C. Sleeman, Jr. Sep. 1972 65 p refs
(NASA-TM-X-2582; L-8358; NAS 1.15:X-2582) Avail: NTIS HC A04/MF A01 CSCL 01B

A low speed wind tunnel test was conducted in the Langley V/STOL tunnel to determine the static longitudinal and lateral stability characteristics of a general research model which simulated an advance configuration for a commercial transport airplane with a T tail. The model had a 42 deg swept, aspect ratio 6.78 wing with a supercritical airfoil and a high lift system which consisted of a leading edge slat and a double slotted flap. Various slat and flap deflection combinations represented clean, take off, and landing configurations. Effects on the longitudinal and lateral aerodynamic characteristics were determined for two flow through,

simulated engine nacelles located on the sides of the fuselage near the rear of the model. Author

N83-11031*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF AN IMPROVED 10-PERCENT-THICK NASA SUPERCRITICAL AIRFOIL
Charles D. Harris Feb. 1974 137 p
(NASA-TM-X-2978; L-9275; NAS 1.15:X-2978) Avail: NTIS HC A08/MF A01 CSCL 01B

Refinements in a 10 percent thick supercritical airfoil produced improvements in the overall drag characteristics at normal force coefficients from about 0.30 to 0.65 compared with earlier supercritical airfoils which were developed for a normal force coefficient of 0.7. The drag divergence Mach number of the improved supercritical airfoil (airfoil 26a) varied from approximately 0.82 at a normal force coefficient to of 0.30, to 0.78 at a normal force coefficient of 0 80 with no drag creep evident. Integrated section force and moment data, surface pressure distributions, and typical wake survey profiles are presented. A.R.H.

N83-11032*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL DEVELOPMENT OF UNDERWING LEADING-EDGE VORTEX GENERATORS ON A NASA SUPERCRITICAL-WING RESEARCH AIRPLANE CONFIGURATION
Dennis W. Bartlett, Charles D. Harris, and Thomas C. Kelly Nov. 1973 118 p refs
(NASA-TM-X-2808; L-8495; NAS 1.15:X-2808) Avail: NTIS HC A06/MF A01 CSCL 01B

A program for the wind tunnel development of underwing leading-edge vortex generators on an NASA supercritical-wing research airplane model was conducted in the Langley 8-foot transonic pressure tunnel at Mach numbers from 0.25 to 0.99. The effects on the longitudinal aerodynamic characteristics of vortex-generator wing semispan location, distance from wing leading edge, leading-edge sweep angle, toe-in angle, and span are presented. The effects of the vortex generators on the lateral-directional aerodynamic characteristics of the model for a sideslip angle of 5 deg are included. Author

N83-11033*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF WING HEIGHT ON LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A MODEL HAVING A 42 DEG SWEPT WING, A SUPERCRITICAL AIRFOIL, DOUBLE-SLOTTED FLAPS, AND A LOW TAIL
Paul G. Fournier and William C. Sleeman, Jr. Sep. 1973 75 p refs
(NASA-TM-X-2794; L-8832; NAS 1.15:X-2794) Avail: NTIS HC A04/MF A01 CSCL 01B

A low speed investigation was conducted in the Langley V/STOL tunnel to determine the static longitudinal lateral stability characteristics of a general research model with the wing in a high position and a low position on the fuselage. The model had a wing with a quarter chord sweep of 42 deg, an aspect ratio of 6.78, a supercritical airfoil, and a high lift system which consisted of a leading edge slat and a double slotted flap. Various slat and flap deflections represented clean, take off, and landing configurations. A 45 deg swept horizontal tail located slightly below the fuselage center line was investigated with both the low and high wing configurations. Author

N83-11034*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A 17-PERCENT-THICK SUPERCRITICAL AIRFOIL SECTION, INCLUDING A COMPARISON BETWEEN WIND-TUNNEL AND FLIGHT DATA
Robert J. McGhee and Gene J. Bingham (Army Air Mobility R & D Lab.) Jul. 1972 55 p refs
(NASA-TM-X-2571; L-8290; NAS 1.15:X-2571) Avail: NTIS HC A04/MF A01 CSCL 01B

Wind-tunnel tests were conducted to determine the low speed two dimensional aerodynamic characteristics of a 17-percent-thick supercritical airfoil. The results were compared with three dimensional wind-tunnel and flight data. The tests were conducted over a Mach number range from 0.15 to 0.30. Reynolds numbers based on the airfoil chord varied from 2.0x10 to the 6th power to 15.0x10 to the 6th power. Author

N83-11035# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF AERONAUTICS
21 Jul. 1982 168 p refs Transl. into ENGLISH of Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 p 1-98
(AD-A118185; FTD-ID(RS)T-0621-82) Avail: NTIS HC A08/MF A01 CSCL 20/4

Aerodynamics research and development in China is discussed. Topics include elastic bodies, aircraft structures, boundary value problems, stress analysis, combustion chambers, and aerodynamic coefficients. For individual titles, see N83-11036 through N83-11047.

N83-11036# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF THE LIFT DISTRIBUTION AND AERODYNAMIC DERIVATIVES OF QUASI-STATIC ELASTIC AIRCRAFT c02
Liu Qiangang, Wu Changlin, and Jian Zheng *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 1-19 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

A numerical method is presented for predicting the aerodynamic characteristics of elastic aircraft under quasi-static approximation. This method can be used to evaluate the lift distribution and 11 main longitudinal aerodynamic derivatives of elastic aircraft at subsonic speeds. The aerodynamic calculations are based on the Green's function method. The structure deformation is evaluated by the free structure influence coefficient method. The combination of these methods can provide an efficient, general and flexible aerodynamic tool for design of elastic aircraft. Several numerical examples are given and some dynamical problems of elastic aircraft are also discussed. The derivatives evaluated can be directly adopted in analysis of stability and control of elastic aircraft. Author

N83-11037# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PRELIMINARY STUDY ON VARIABLE POROSITY WALLS FOR A TRANSONIC WIND TUNNEL c09
Zhang Qiwei *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 20-32 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 14/2

In order to reduce the wall interference and improve quality of the flow field in a transonic wind tunnel, a set of variable porosity walls with 60 degree inclined holes was designed and manufactured. The open-area ratio of the walls can vary continually from zero to 9.2 percent. The walls were used in a 600 mm x 600 mm tran- and supersonic wind tunnel with solid side walls. The general characteristics of the variable porosity walls and the preliminary results of calibration at Mach numbers ranging rom 0.6 to 1.2 are described. R.J.F.

N83-11038# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A NEW SIMULTANEOUS ITERATION ALGORITHM FOR EVALUATION OF EIGENPROBLEMS IN LARGE STRUCTURES c39
Liu Guoguang and Li Junjie *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 33-45 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

A new improved algorithm of simultaneous iterations is presented for evaluation of generalized eigenproblems in the dynamic analysis of large structures. The convergence of this algorithm is proved by the concepts of Ex subspace and eigendirection. Some details of how to perform this algorithm in the computer are discussed. Based on statistics of computational quantity required for each step of iteration and a great number of practical computations, it is shown that in convergence rate the present method is comparable to some simultaneous or subspace iteration algorithms available up to now, but it can cut down the computer run time for each step of iteration and raise the computation efficiency. Author

N83-11039# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SOME PROBLEMS OF PLATE BENDING HYBRID MODEL WITH SHEAR EFFECT **c39**

Wu Changchun *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 46-60 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34641 (For primary document see N83-11035 02-01)

Avail: NTIS HC A08/MF A01 CSCL 20/11

A triangular plate bending hybrid element is constructed according to Reissner's principle. It has 9 degrees of freedom and takes the shear effect into account. The formulation of the thick plate is extended to the thin plate. The shear locking phenomenon can be avoided through imposing the discrete type of Kirchhoff's constraints. It is interesting to note that the kind of discrete constraints can be directly imposed by means of Hermite interpolation. The specific matching between bending and shearing is discussed in the analysis of the thick plate. It is shown that the reasonable matching between bending and shearing complementary energies may be destroyed by inhomogeneous magnification of the discretization errors. Furthermore, a principle of energy regulation is put forward, with the aid of which this matching problem is effectively treated so that the unified analysis of the thick and thin plates is achieved. Finally, numerical examples are given. R.J.F.

N83-11040# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A LOCAL STRAIN FATIGUE ANALYSIS METHOD AND COMPUTER PROGRAM **c39**

Wu Yisheng *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 61-74 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34642 (For primary document see N83-11035 02-01)

Avail: NTIS HC A08/MF A01 CSCL 20/11

A local strain fatigue analysis method is presented for evaluation of fatigue life. First, the three parameter elements of load increment, strain increment and stress increment are constructed by using the cyclic stress-strain curve of the material and the cyclic load notched strain curve of notched specimens. Then the local stress-strain analysis of notched specimens under complex loading is made by means of these elements and availability coefficient matrix given by R.M. Wetzel. The damage of each cycle is determined on the basis of local strain amplitude and correlation for the effect of mean stress. Last, the damage can be cumulated according to Miner's linear cumulative damage theory and the life can be evaluated. The features of this method consist in adoption of three parameter elements of load increment, stress increment and strain increment. R.J.F.

N83-11041# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SHOCK WAVE BOUNDARY LAYER INTERACTION IN COMPRESSOR CASCADES **c07**

Yu Shen *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 75-84 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced at A82-34643 (For primary document see N83-11035 02-01)

Avail: NTIS HC A08/MF A01 CSCL 21/5

Shock wave boundary layer interaction in compressor cascades is discussed. It is shown by calculation and analysis that the main form of the interaction in compressor cascades is the interaction between shock waves and turbulent boundary layer in channels. The analysis made clear that the separation criterion proposed by Pearcey is an empirical criterion obtained from wind tunnel tests of a RAE102 airfoil. The conditions are quite different from the restrained channel flow in compressor cascades with strong adverse pressure gradient. As for compressor cascades, the boundary layer grows rapidly and separates at lower Mach number upstream of the shock wave. The length of separated region and the location of vortex sheet are all different from those in the case of Pearcey's single airfoil. The conclusion was drawn that it is inappropriate to apply Pearcey's separation criterion directly to shock wave boundary layer interaction in compressor cascades. It is proposed that the separation criterion for shock wave boundary layer interaction in compressor cascades be in the form which involves the effects of pressure gradients in front of and behind the shock wave. R.J.F.

N83-11042# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL STUDY ON DISCHARGE AND LOSS COEFFICIENTS OF COMBUSTOR SWIRLERS **c07**

Zhang Chunxia and Wang Yulian *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 85-95 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34644 (For primary document see N83-11035 02-01)

Avail: NTIS HC A08/MF A01 CSCL 21/5

Some test results of blade-type swirlers with different stagger angles, numbers of blades, and flow areas in jet engine combustors are presented. A set of discharge characteristics and relations between loss coefficient and swirl number, stagger angle or blade number are provided. In addition, the correlation of loss coefficient to discharge coefficient of blade-type swirlers was established. It is found that the discharge coefficient varies from 0.6 to 0.9 for swirlers with different stagger angles. The selection of swirl number must retain the loss coefficient at an acceptable level (aerodynamically). It can be seen from the test results that the blade loss for a straight blade swirler with stagger angle varying from 68 to 70 degrees. The tests proved that the twisted blade swirler is superior to the straight one from the aerodynamic point of view, but its manufacture is more complicated. R.J.F.

N83-11043# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ASYMPTOTIC STABILITY OF PARTIALLY DAMPED MECHANICAL SYSTEMS **c64**

Gao Weibin *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 96-108 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)

Avail: NTIS HC A08/MF A01 CSCL 12/1

The asymptotic stability of the partially damped linear mechanical system with gyroscopic forces is studied. The equation of motion for the system is a second order linear matrix differential equation. The stiffness matrix is assumed to be positive definite representing the conservative forces and then Lyapunov's second method is employed. By splitting the system matrices into block matrices, the condition of asymptotic stability (e.g, the condition of pervasiveness) can be expressed as a rank condition of a certain matrix dimension lower than that of the system. Several cases with different gyroscopic coupling are discussed. The stability condition is not only simpler than that obtained by former authors, but also gives some insight to the mechanical properties of the system since it may then be considered as two coupled subsystems. R.J.F.

N83-11044# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AERODYNAMIC COEFFICIENT IDENTIFICATION OF TIME-VARYING AIRCRAFT SYSTEM AND ITS APPLICATION c02
Wang Tong *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 109-123 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01A

Aerodynamic coefficient identification for time-varying aircraft system was studied. On the basis of practical measurement in flight tests and by analyzing trend of the coefficients in aircraft time-varying differential equations, it is possible to transform the individual time-varying coefficient into a known function multiplied by an unknown constant. These unknown constants are referred to as undefined coefficients. With the aid of the Newton-Raphson method extended to the time-varying coefficient differential equations, the undefined coefficients can be evaluated by iteration calculation. In this way the complicated time-varying aircraft identification can be carried out. In order to verify this calculation, the aerodynamic coefficients of an aircraft were evaluated by the data taken from unsteady flight, and the reliability of aerodynamic coefficients obtained from this identification was discussed. The calculation results matched very well the test data and made a contribution to the improvement of aircraft flight tests. R.J.F.

N83-11045# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN ADJUSTMENT METHOD AND ENGINEERING REALIZATION FOR CONTROL CURVES OF THE 2-VARIABLE FUNCTION c05
Shao Rongshi *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 124-139 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01/3

Through designing a bypass-door system for a supersonic aircraft, which implemented adjustment in conformity to the control curves of the two-variable function, a method for engineering realization of some separable multivariable functions was put forward. It means, for any control function of n variables the function, called separable by the author, can be divided into subfunction of each single variable, then the sum of these subfunctions is just equal to the original function. A practical bridge circuit with parameters realizing the control curves for the bypass-door was designed. Moreover, the simple method of changing the characteristics of the control curves by adjusting resistors on the bridge arms was adopted according to the test flight requirements of the system, and an actual numerical example was given. R.J.F.

N83-11046# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STRAIN FATIGUE PROPERTIES AND FATIGUE DISLOCATION STRUCTURES OF 2024 ALUMINUM ALLOY c26
Li Qingsheng, Tsai Chikung, Chen Xianxi, Pan Tianxi, and Zhou Zhaoxiang *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 140-149 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 11/6

The relation between the strain fatigue properties and the fatigue dislocation structures in 2024 aluminum alloy is studied. The analysis of deformation work density for smooth fatigue specimens shows that the strain fatigue properties of specimens aged at 240 C are much better than naturally aged specimens at high strain level. Study of fatigue dislocation structures in this alloy under the transmission electron microscope reveals that wavy slip mode at high strain level and plain slip mode at low strain level are characteristics of the dislocation slip in the naturally aged specimens. In contrast, cross slip is much easier in the 240 C aged specimens at different strain levels. By foil thickness analysis the existence of (112) slip plane in 240 C aged specimens was confirmed. It is also pointed out that the helical dislocations in the alloy are formed through cutting of moving dislocations with dislocation loops. The conclusion was that the features of dislocation slip serve as an essential factor which affects the interaction of dislocations with other microstructures and determines the fatigue properties. R.J.F.

N83-11047# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF MICROSTRUCTURE OF CARBON-ALUMINUM COMPOSITES c24
Zheng Lide, Zhang Guoding, Wang Wenrong, and Shi Peiyuan *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 150-157 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 11/4

The microstructures of the carbon fibers, carbon fibers coated with nickels, carbon fibers with a nickel layer after vacuum heat treatment, and carbon-aluminum composite wires and their specimens fabricated by hot pressing under the different technological conditions were studied with the metallographic and sweep electron microscopes. An analysis of the microstructure of each is given. R.J.F.

N83-11048# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERNATIONAL AVIATION (SELECTED ARTICLES)
15 Jul. 1982 32 p Transl. into ENGLISH from Guoji Hangkong (China), no. 2, 1982 p 2-10
(AD-A118270; FTD-ID(RS)T-0606-82) Avail: NTIS HC A03/MF A01 CSCL 01/3

An assessment of the USSR's fighter aircraft and turbojet engine development is presented. Predictions as to future Soviet development are included. For individual titles, see N83-11049 through N83-11050.

N83-11049# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT AND TECHNICAL LEVEL OF INTERCEPTION PLANES IN THE USSR c05
Wu Yongzhi *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS)T-0606-82) 15 Jul. 1982 p 1-13 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, 1982 p 2-10 (For primary document see N83-11048 02-01)
Avail: NTIS HC A03/MF A01 CSCL 01/3

The development of interceptor military aircraft in the USSR since World War II is described. Predictions as to the Soviet fighter aircraft to become operational in the late 1980's and 1990's are also included. L.F.M.

N83-11050# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF DOUBLE-ROTOR SUPERCHARGED TURBOJET ENGINES IN THE USSR AS SEEN FROM MODELS R11 TO R29 c07
Liu Chunyi *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS)T-0606-82) 15 Jul. 1982 p 16-27 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, 1982 p 2-10 (For primary document see N83-11048 02-01)
Avail: NTIS HC A03/MF A01 CSCL 21/5

The development of double rotor turbojet aircraft engines in the USSR is described. The Soviet philosophy in their development of jet engines is compared with that of the West. L.F.M.

N83-11051# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERNATIONAL AVIATION (SELECTED ARTICLES)
15 Jul. 1982 39 p Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48
(AD-A118322; FTD-ID(RS)T-0679-82) Avail: NTIS HC A03/MF A01 CSCL 01/3

Refitting aerogas turbine engines for multiple uses is discussed. Dye forging titanium discs on a gunpowder hammer is reported.

Assembly and painting of the Yier-86 passenger plane is described. For individual titles, see N83-11052 through N83-11054.

N83-11052# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PROBLEMS OF REFITTING AERO-GAS TURBINE ENGINES FOR MULTIPLE USES **c07**
Chen Guang *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS) T-0679-82) 15 Jul. 1982 p 1-14 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 21/5

When aerogas turbine engines (including turbojets, turbofans, turboprops and turboshafts) are changed into gas turbines for use other than in aviation (industry and ships) most of the time the aerogas turbine engine is transformed into a gas generator. Linking the gas generator and power turbine are a diffuser box and air intake device. In order to adapt to the changes of industrial conditions, it is necessary to make relevant modifications of the structural and cyclical parameters in the refit. Many of the present refitting problems concerning the multiple uses of aerogas turbine engines are addressed. Author

N83-11053# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SUCCESS OF DYE FORGING TITANIUM DISCS ON A GUN-POWDER HAMMER **c26**
Li Chenggong *In its* Intern. Aviation (Selected Articles) (FTD-ID (RS)T-0679-82) 15 Jul. 1982 p 15-21 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 11/6

A 40 ton meter gunpowder hammer was developed and successfully used to forge titanium aircraft engine compressor disks. The gunpowder hammer is a dye forging device which uses gunpowder as the power source. Author

N83-11054# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE GENERAL ASSEMBLY AND PAINTING OF THE YIER - 86 PASSENGER PLANE **c05**
Wang Zhongzhi *In its* Intern. Aviation (Selected Articles) (FTD-ID (RS)T-0679-82 15 Jul. 1982 p 22-34 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 01/3

Procedures followed in assembling and painting the Yier-86 passenger aircraft are described. N.W.

N83-11055# Comptroller General of the United States, Washington, D.C. Procurement Logistics and Readiness Div.
REQUIREMENTS AND PRODUCTION CAPABILITIES ARE UNCERTAIN FOR SOME AIR FORCE, NAVY AND MARINE CORPS AIRCRAFT SPARES AND REPAIR PARTS
22 Jul. 1982 38 p refs
(AD-A118423; GAO/PLRD-82-77) Avail: NTIS HC A03/MF A01 CSCL 05/1

In fiscal year 1982, the Congress appropriated $5.4 billion to procure spares and repair parts for Air Force, Navy and Marine Corps aircraft. This compared to $1.9 billion provided in fiscal year 1980 and $3.9 billion provided in fiscal year 1981. The military services testified that these increases were required to improve the operational readiness of their aircraft. However, GAO has previously reported that many aircraft operational readiness problems were caused by maintenance problems and other reasons--unexpected parts failures, late repair of parts, and modification or updating of parts--rather than a lack of sufficient funds. While approving these increases, the Congress expressed concern regarding whether the aerospace industry could produce the increased quantity of aircraft parts and whether the increased procurements would result in the increased operational readiness claimed by the services. Author (GRA)

N83-11056# George Washington Univ., Washington, D.C. Office of Program in Logistics.
AIRCRAFT PRODUCTION AND DEVELOPMENT SCHEDULES
Robert A. Harrison 15 Apr. 1982 12 p refs
(Contract N00014-75-C-0729; NR Proj. 347-020)
(AD-A118047; SERIAL-T-463) Avail: NTIS HC A02/MF A01 CSCL 01/3

A model of aircraft life cycle cost is developed. This cost is estimated to be a function of the production schedule. The effect modeled is the cost variation as a function of increasing aircraft reliability achieved after the completion of a number of operating hours. An optimization problem is outlined that yields the best production schedule. A search algorithm for this difficult integer nonlinear programming problem is used to find the optimum schedule. Present practices with advanced jet aircraft are found to be suboptimal in several respects. Recommendations include a linear production buildup that continues much longer than at present and extension of the development phase of an aircraft program well beyond the current termination time. Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-11057# Aeronautical Research Labs., Melbourne (Australia).
AN INTERFEROMETRIC INVESTIGATION OF THE NEAR DESIGN POINT FLOW OVER SUPERCRITICAL AEROFOIL BGK-1
N. Pollock Jan. 1982 40 p refs
(ARL-AERO-Note-405; AR-002-328) Avail: NTIS HC A03/MF A01

The upper surface flow over a supercritical aerofoil BGK-1 near its design condition was studied using a laser interferometer. The tests were carried out at a chord Reynolds number of 1.65 million with transition free and artificially fixed at various chordwise locations. The interferograms were analysed to produce 'instantaneous' surface pressure distributions for comparison with conventional time averaged distributions obtained from surface tappings. The results show that the upper surface flow is unsteady with both fixed and free transition. They also indicate that artificially fixing transition in low Reynolds number tests does not produce an accurate simulation of the high Reynolds number flow for conditions near the design point. S.L.

N83-11058*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A TANDEM-ROTOR/TANDEM-STATOR CONICAL-FLOW COMPRESSOR DESIGNED FOR A PRESSURE RATIO OF 3
Jerry R. Wood, Albert K. Owen (Army Aviation Research and Development Command, Cleveland, Ohio), and Lawrence F. Schumann (Army Aviation Research and Development Command, Cleveland, Ohio) Oct. 1982 38 p refs
(NASA-TP-2034; E-369; NAS 1.60:2034; AVRADCOM-TR-81-C-5)
Avail: NTIS HC A03/MF A01 CSCL 01A

A conical-flow compressor stage with a large radius change through the rotor was tested at three values of rotor tip clearance. The stage had a tandem rotor and a tandem stator. Peak efficiency at design speed was 0.774 at a pressure ratio of 2.613. The rotor was tested without the stator, and detailed survey data were obtained for each rotor blade row. Overall peak rotor efficiency was 0.871 at a pressure ratio of 2.952. Author

N83-11059*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF INSTALLATION EFFECTS OF SINGLE-ENGINE CONVERGENT-DIVERGENT NOZZLES
James R. Burley, II and Bobby L. Berrier Nov. 1982 234 p refs

(NASA-TP-2078; L-15343; NAS 1.60:2078) Avail: NTIS HC A11/MF A01 CSCL 01A

An investigation was conducted in the Langley 16-Foot Transonic Tunnel to determine installation effects on single-engine convergent-divergent nozzles applicable to reduced-power supersonic cruise aircraft. Tests were conducted at Mach numbers from 0.50 to 1.20, at angles of attack from -3 degrees to 9 degrees, and at nozzle pressure ratios from 1.0 (jet off) to 8.0. The effects of empennage arrangement, nozzle length, a cusp fairing, and afterbody closure on total aft-end drag coefficient and component drag coefficients were investigated. Basic lift- and drag-coefficient data and external static-pressure distributions on the nozzle and afterbody are presented and discussed. Author

N83-11060*# Continuum, Inc., Huntsville, Ala.
A VARIATIONAL PRINCIPLE FOR COMPRESSIBLE FLUID MECHANICS: DISCUSSION OF THE MULTI-DIMENSIONAL THEORY Interim Report
Robert Joel Prozan Washington NASA Oct. 1982 33 p refs (Contract NAS1-16646)
(NASA-CR-3614; NAS 1.26:3614; CI-TR-0062) Avail: NTIS HC A03/MF A01 CSCL 01A

The variational principle for compressible fluid mechanics previously introduced is extended to two dimensional flow. The analysis is stable, exactly conservative, adaptable to coarse or fine grids, and very fast. Solutions for two dimensional problems are included. The excellent behavior and results lend further credence to the variational concept and its applicability to the numerical analysis of complex flow fields. Author

N83-11061*# Applied Inst. of Mathematics, Inc., Evanston, Ill.
A NONLINEAR STRUCTURAL CONCEPT FOR COMPLIANT WALLS Final Report
Edward L. Reiss Washington NASA Oct. 1982 40 p refs (Contract NAS1-14717)
(NASA-CR-3628; NAS 1.26:3628) Avail: NTIS HC A03/MF A01 CSCL 01A

Two mechanisms of drag reduction for flow over flat plates were investigated. The first mechanism employs Bushnell's hypothesis that compliant walls produce drag reduction by interfering with the formation of the turbulent spots in a turbulent boundary layer. It is shown that the amplitudes and frequencies of compliant wall motions for drag reduction might be achieved by using slightly curved walls and the resulting large amplitude motions of snap buckling. A simple structural model of an arch is used in the analysis, and an asymptotic method is developed. The required wall motions can be obtained by using materials like mylar. In addition, the delay of transition from laminar to turbulent flow by driven walls was studied for Poiseuille channel flow. The walls are driven by a periodic traveling wave. A significant increase in the transitional Reynolds number is obtained by appropriately prescribing the wavelength and phase velocity of the wall motion. Previously developed asymptotic methods are used in the analysis. M.G.

N83-11062*# Systems Technology, Inc., Hawthorne, Calif.
STABILITY AND CONTROL OF THE GOSSAMER HUMAN POWERED AIRCRAFT BY ANALYSIS AND FLIGHT TEST Final Report
Henry R. Jex and David G. Mitchell Washington NASA Oct. 1982 83 p refs Revised
(Contract NAS4-2705)
(NASA-CR-3627; NAS 1.26:3627; STI-TR-2109-1; AV-R-82/520) Avail: NTIS HC A05/MF A01 CSCL 01A

The slow flight speed, very light wing loading, and neutral stability of the Gossamer Condor and the Gossamer Albatross emphasized apparent-mass aerodynamic effects and unusual modes of motion response. These are analyzed, approximated, and discussed, and the resulting transfer functions and dynamic properties are summarized and compared. To verify these analytical models, flight tests were conducted with and electrically powered Gossamer Albatross II. Sensors were installed and their outputs were telemetered to records on the ground. Frequency sweeps of the various controls were made and the data were reduced to frequency domain measures. Results are given for the response of: pitch rate, airspeed and normal acceleration from canard-elevator deflection; roll rate and yaw rate from canard-rudder tilt; and roll rate and yaw rate from wing warp. The reliable data are compared with the analytical predictions. A.R.H.

N83-11063*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COLD-AIR PERFORMANCE OF COMPRESSOR-DRIVE TURBINE OF DEPARTMENT OF ENERGY UPGRADED AUTOMOBILE GAS TURBINE ENGINE. 2: STAGE PERFORMANCE
Richard J. Roelke and Jeffrey E. Haas Oct. 1982 18 p refs Prepared in cooperation with Army Aviation Research and Development Command, Cleveland
(Contract EC-77-A-31-1011)
(NASA-TM-82818; DOE/NASA/1011-36; NAS 1.15:82818; AVRADCOM-TR-82-C-1) Avail: NTIS HC A02/MF A01 CSCL 10B

The aerodynamic performance of the compressor-drive turbine of the DOE upgraded gas turbine engine was determined in low temperature air. The as-received cast rotor blading had a significantly thicker profile than design and a fairly rough surface finish. Because of these blading imperfections a series of stage tests with modified rotors were made. These included the as-cast rotor, a reduced-roughness rotor, and a rotor with blades thinned to near design. Significant performance changes were measured. Tests were also made to determine the effect of Reynolds number on the turbine performance. Comparisons are made between this turbine and the compressor-drive turbine of the DOE baseline gas turbine engine. Author

N83-11064*# Rockwell International Science Center, Thousand Oaks, Calif.
A FULL POTENTIAL INVERSE METHOD BASED ON A DENSITY LINEARIZATION SCHEME FOR WING DESIGN Final Report, 29 Aug. 1980 - 28 Aug. 1981
Vijaya Shankar Hampton, Va. NASA. Langley Research Center Oct. 1982 31 p refs
(Contract NAS1-16379)
(NASA-CR-165991; NAS 1.26:165991; SC5277.21FR) Avail: NTIS HC A03/MF A01 CSCL 01A

A mixed analysis inverse procedure based on the full potential equation in conservation form was developed to recontour a given base wing to produce density linearization scheme in applying the pressure boundary condition in terms of the velocity potential. The FL030 finite volume analysis code was modified to include the inverse option. The new surface shape information, associated with the modified pressure boundary condition, is calculated at a constant span station based on a mass flux integration. The inverse method is shown to recover the original shape when the analysis pressure is not altered. Inverse calculations for weakening of a strong shock system and for a laminar flow control (LFC) pressure distribution are presented. Two methods for a trailing edge closure model are proposed for further study. Author

N83-11065*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
THREE-DIMENSIONAL FLOW MEASUREMENTS IN A VANELESS RADIAL TURBINE SCROLL
W. Tabakoff, B. Wood, and B. V. R. Vittal Aug. 1982 43 p refs (Grant NAG3-26)
(NASA-CR-167994; NAS 1.26:167994) Avail: NTIS HC A03/MF A01 CSCL 01A

The flow behavior in a vaneless radial turbine scroll was examined experimentally. The data was obtained using the slant sensor technique of hot film anemometry. This method used the unsymmetric heat transfer characteristics of a constant temperature hot film sensor to detect the flow direction and magnitude. This was achieved by obtaining a velocity vector measurement at three sensor positions with respect to the flow. The true magnitude and direction of the velocity vector was then found using these values and a Newton-Raphson numerical technique. The through flow

and secondary flow velocity components are measured at various points in three scroll sections. M.G.

N83-11066*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
A COMPUTER PROGRAM FOR THE CALCULATION OF THE FLOW FIELD INCLUDING BOUNDARY LAYER EFFECTS FOR MIXED-COMPRESSION INLETS AT ANGLE OF ATTACK Final Report
Joseph Vadyak and Joe D. Hoffman Oct. 1982 152 p refs
(Grant NsG-3311)
(NASA-CR-168002; NAS 1.26:168002) Avail: NTIS HC A08/MF A01 CSCL 01A

A computer program was developed which is capable of calculating the flow field in the supersonic portion of a mixed compression aircraft inlet operating at angle of attack. The supersonic core flow is computed using a second-order three dimensional method-of-characteristics algorithm. The bow shock and the internal shock train are treated discretely using a three dimensional shock fitting procedure. The boundary layer flows are computed using a second-order implicit finite difference method. The shock wave-boundary layer interaction is computed using an integral formulation. The general structure of the computer program is discussed, and a brief description of each subroutine is given. All program input parameters are defined, and a brief discussion on interpretation of the output is provided. A number of sample cases, complete with data listings, are provided. B.W.

N83-11067# National Aerospace Lab., Tokyo (Japan).
EXPERIMENTAL WORKS IN THE ANL HIGH REYNOLDS NUMBER TWO-DIMENSIONAL TRANSONIC WIND TUNNEL ON ADVANCED TECHNOLOGY AND NACA AIRFOILS
Kazuaki Takashima [1982] 11 p refs Presented at the ICAS/AIAA Aircraft Systems and Technol. Meeting, Seattle, 23-27 Aug. 1982
Avail: NTIS HC A02/MF A01

A description of a new wind tunnel at NAL and some results of initial calibration and tests of new transonic airfoils are presented. In order to test the new transonic airfoils at high Reynolds number, a two dimensional transonic pressure wind tunnel at NAL, Japan was constructed in 1979. This blowdown type wind tunnel has a 0.3 meter wide and 1.0 meter high test section. The performance is 0.2 to 1.15 of Mach number range and 40 x 10 to the 6th power of maximum Reynolds number with 10 seconds running time. The wind tunnel starting operation is conducted with precharged air in the tunnel. Closed loop Mach number control is successively applied with excellent regulation and repeatability. Results of the initial calibration indicate adequate performance of the tunnel. The conventional airfoil data are compared with other published experimental results. The Reynolds number effects on the aerodynamic characteristics of NACA 0012 section were experimentally investigated. A few transonic airfoils which were developed at NAL were tested and compared with theoretical and numerical results. Comparisons demonstrated good correspondence in some cases as well as gross discrepancies in other cases and those suggest the importance of experimental works.
Author

N83-11068*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A 9.3-PERCENT-THICK SUPERCRITICAL AIRFOIL SECTION
Kevin W. Noonan and Robert J. McGhee Aug. 1982 51 p refs
(NASA-TM-X-72763; NAS 1.15:X-72763) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation was conducted in the Langley low turbulence pressure tunnel to determine the low-speed, two dimensional characteristics of a 9.3 percent-thick supercritical airfoil. The airfoil was tested at Reynolds numbers (based on chord) from 2.9 million to 16.8 million, at Mach numbers from 0.10 to 0.36, and at geometric angles of attack from -8 degrees to 14 degrees. Author

N83-11069*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TABULATED PRESSURE MEASUREMENTS ON AN EXECUTIVE-TYPE JET TRANSPORT MODEL WITH A SUPERCRITICAL WING
Dennis W. Bartlett Sep. 1975 467 p refs
(NASA-TM-X-72701; NAS 1.15:X-72701) Avail: NTIS HC A20/MF A01 CSCL 01A

A 1/9 scale model of an existing executive type jet transport refitted with a supercritical wing was tested on in the 8 foot transonic pressure tunnel. The supercritical wing had the same sweep as the original airplane wing but had maximum thickness chord ratios 33 percent larger at the mean geometric chord and almost 50 percent larger at the wing-fuselage juncture. Wing pressure distributions and fuselage pressure distributions in the vicinity of the left nacelle were measured at Mach numbers from 0.25 to 0.90 at angles of attack that generally varied from -2 deg to 10 deg. Results are presented in tabular form without analysis. S.L.

N83-11070*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF SEVERAL HIGH ASPECT-RATIO SUPERCRITICAL WING CONFIGURATIONS ON A WIDE-BODY-TYPE FUSELAGE
Dennis W. Bartlett Jul. 1977 407 p refs
(NASA-TM-X-71996; NAS 1.15:X-71996) Avail: NTIS HC A18/MF A01 CSCL 01A

An investigation was conducted in the Langley 8-foot transonic pressure tunnel on two aspect-ratio 11.95 supercritical wings that were tested in combination with a representative wide-body-type fuselage. The two supercritical wings have identical planforms for equal sweep angles and differ only in thickness. Each wing was tested at quarter-chord sweep angles of 27 deg and 30 deg. At the higher sweep angle, the aspect ratio is redued to 11.36. At 27 deg of quarter-chord sweep, the thicker supercritical wing (SCW-1) has maximum streamwise thickness-to-chord ratios of 0.16 at the wing-fuselage juncture, 0.14 at the planform break station, and 0.12 at the tip. The thinner wing (SCW-2) has maximum streamwise thickness-to-chord ratios of 0.144, 0.12, and 0.10 at the same stations respectively. Tests were also conducted on the thinner supercritical wing at the 27 deg sweep angle with a 15.24 cm (6.0 in.) shorter span which results in an aspect ratio of 10.25. For comparison, data were obtained on a current wide-body transport wing (AR=7) that was tested on the same fuselage used with the supercritical wings. Author

N83-11071*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE NASA SUPERCRITICAL-WING TECHNOLOGY
Dennis W. Bartlett and James C. Patterson, Jr. Jul. 1978 23 p refs Presented at the CTOL Transport Technol. Conf., Hampton, Va., 28 Feb. - 3 Mar. 1978
(NASA-TM-78731; L-12341; NAS 1.15:78731) Avail: NTIS HC A02/MF A01 CSCL 01A

A number of high aspect ratio supercritical wings in combination with a representative wide body type fuselage were tested in the Langley 8 foot transonic pressure tunnel. The wing parameters investigated include aspect ratio, sweep, thickness to chord ratio, and camber. Subsequent to these initial series of tests, a particular wing configuration was selected for further study and development. Tests on the selected wing involved the incorporation of a larger inboard trailing edge extension, an inboard leading edge extension, and flow through nacelles. Range factors for the various supercritical wing configurations are compared with those for a reference wide body transport configuration. M.G.

N83-11072*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT EXPERIENCES WITH THREE-DIMENSIONAL TRANSONIC POTENTIAL FLOW CALCULATIONS
David A. Caughey (Cornell Univ.), Perry A. Newman (New York Univ.), and Antony Jameson Jul. 1978 25 p Presented at the

CTOL Transport Technol. Conf., Hampton, Va., 28 Feb. - 3 Mar. 1978
(Grants NGR-33-016-167; NGR-33-016-201; Contracts N00014-77-C-0033; N00014-77-C-0032)
(NASA-TM-78733; L-12359; NAS 1.15:78733) Avail: NTIS HC A02/MF A01 CSCL 01A

Some recent experiences with computer programs capable of solving finitie-difference approximations to the full potential equation for the transonic flow past three dimensional swept wings and simple wing-fuselage combinations are discussed. The programs used are a nonconservative program for swept wings, a quasi-conservative finite-volume program capable of treating swept wings mounted on fuselages of slowly varying circular cross section, and a fully conservative finite volume scheme capable of treating swept wings and wing-cylinder combinations. The present capabilities of these codes are reviewed. The relative merits of the conservative and nonconservative formulations are discussed, and the results of calculations including corrections for the boundary-layer displacement effect are presented. RJF

N83-11073*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF DIFFERENTIAL AND SYMMETRICAL AILERON DEFLECTION ON THE AERODYNAMIC CHARACTERISTICS OF AN NASA SUPERCRITICAL-WING RESEARCH AIRPLANE MODEL
Dennis W. Bartlett Oct. 1975 66 p refs
(NASA-TM-X-3231; L-10220; NAS 1.15:X-3231) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation has been conducted in the Langley 8 foot transonic pressure tunnel to determine the effects of differential and symmetrical aileron deflection on the longitudinal and lateral directional aerodynamic characteristics of an 0.087 scale model of an NASA supercritical wing research airplane (TF-8A). Tests were conducted at Mach numbers from 0.25 to 0.99 in order to determine the effects of differential aileron deflection and at Mach numbers of 0.25 and 0.50 to determine the effects of symmetrical aileron (flap) deflection. The angle of attack range for all tests varied from approximately -12 deg to 20 deg. Author

N83-11074*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC AERODYNAMIC CHARACTERISTICS OF A MODEL WITH A 17 PERCENT-THICK SUPERCRITICAL WING
James C. Ferris May 1972 143 p refs
(NASA-TM-X-2551; L-8081; NAS 1.15:X-2551) Avail: NTIS HC A07/MF A01 CSCL 01A

The statis stability and control characteristics and air loads on the wing and aileron of a 0.09 scale model of an airplane with a 17 percent thick supercritical wing were investigated. The longitudinal aerodynamic characteristics were determined over a lift coefficient range sufficiently high to induce buffet onset at Mach numbers from 0.30 to 0.80. In addition, the lateral aerodynamic characteristics were determined as a function of sideslip angle and angle of attack at selected Mach numbers. M.G.

N83-11075*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF THE 10-PERCENT-THICK NASA SUPERCRITICAL AIRFOIL 33 DESIGNED FOR A NORMAL-FORCE COEFFICIENT OF 0.7
Charles D. Harris 1975 105 p refs
(NASA-TM-X-72711; NAS 1.15:X-72711) Avail: NTIS HC A06/MF A01 CSCL 01A

A 10-percent-thick supercritical airfoil based on an off-design sonic-pressure plateau criterion was developed and experimental aerodynamic characteristics measured. The airfoil had a design normal-force coefficient of 0.7 and was identified as supercritical airfoil 33. Results show the airfoil to have good drag rise characteristics over a wide range of normal-force coefficients with no measurable shock losses up to the Mach numbers at which drag divergence occurred for normal-force coefficients up to 0.7. Comparisons of experimental and theoretical characteristics were made and composite drag rise characteristics were derived for normal-force coefficients of 0.5 and 0.7 and a Reynolds number of 40 million. Author

N83-11076*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF THE EXPERIMENTAL AERODYNAMIC CHARACTERISTICS OF THEORETICALLY AND EXPERIMENTALLY DESIGNED SUPERCRITICAL AIRFOILS
Charles D. Harris Jul. 1974 136 p refs
(NASA-TM-X-3082; L-9548; NAS 1.15:X-3082) Avail: NTIS HC A07/MF A01 CSCL 01A

A lifting airfoil theoretically designed for shockless supercritical flow utilizing a complex hodograph method has been evaluated in the Langley 8-foot transonic pressure tunnel at design and off-design conditions. The experimental results are presented and compared with those of an experimentally designed supercritical airfoil which were obtained in the same tunnel. Author

N83-11077*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF A 14-PERCENT-THICK NASA SUPERCRITICAL AIRFOIL DESIGNED FOR A NORMAL-FORCE COEFFICIENT OF 0.7
Charles D. Harris Jul. 1975 101 p refs
(NASA-TM-X-72712; NAS 1.15:X-72712) Avail: NTIS HC A05/MF A01 CSCL 01A

This report documents the experimental aerodynamic characteristics of a 14 percent thick supercritical airfoil based on an off design sonic pressure plateau criterion. The design normal force coefficient was 0.7. The results are compared with those of the family related 10 percent thick supercritical airfoil 33. Comparisons are also made between experimental and theoretical characteristics and composite drag rise characteristics derived for a full scale Reynolds number of 40 million. Author

N83-11078*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF 10 PERCENT THICK NASA SUPERCRITICAL AIRFOILS WITH DIFFERENT AFT CAMBER
Charles D. Harris Feb. 1975 192 p refs
(NASA-TM-X-72007; NAS 1.15:X-72007) Avail: NTIS HC A09/MF A01 CSCL 01A

The aerodynamic characteristics of several supercritical airfoils interim to the improved 10-percent thick NASA supercritical airfoil 26a are discussed. The airfoils have related slope and curvature distributions over the rear which result in different aft camber. For identification, the airfoils are designated supercritical airfoils 12, 13, 21, 22, and 24. Data is presented without analysis. Author

N83-11079*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF TWO SUPERCRITICAL AIRFOILS WITH A THICKNESS-TO-CHORD RATIO OF 0.20 AND DESIGN LIFT COEFFICIENTS OF 0.3 AND 0.4
Lloyd S. Jernell 1 Sep. 1976 30 p refs
(NASA-TM-X-73948; NAS 1.15:X-73948) Avail: NTIS HC A03/MF A01 CSCL 01A

Two supercritical airfoils were developed specifically for application to span distributed loading cargo aircraft. These airfoils have a thickness-to-chord ratio of 0.20 and design lift coefficients of 0.3 and 0.4, and were derived by modifying a recently developed supercritical airfoil having a thickness-to-chord ratio of 0.18 and a design lift coefficient of 0.5. The aerodynamic characteristics were calculated using a theoretical method which computes the flow field about an airfoil having supercritical surface velocities. Author

N83-11080*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF EXPERIMENTAL AND THEORETICAL DRAG CHARACTERISTICS FOR A 10-PERCENT-THICK SUPERCRITICAL AIRFOIL USING A NEW VERSION OF AN ANALYSIS CODE

Charles D. Harris and Dennis O. Allison Jun. 1977 49 p refs (NASA-TM-X-74041; NAS 1.15:X-74041) Avail: NTIS HC A03/MF A01 CSCL 01A

Comparisons of experimental and theoretical drag characteristics for a 10-percent-thick supercritical airfoil using a new version of an advanced analysis code. Comparisons are made at near-design normal-force coefficients for Reynolds numbers from 2 to 11 million. Comments are made concerning various input parameters to the code. R.J.F.

N83-11081*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A MODEL WITH A MODIFIED 17 PERCENT THICK SUPERCRITICAL WING

James C. Ferris May 1975 40 p refs (NASA-TM-X-3211; L-9960; NAS 1.15:X-3211) Avail: NTIS HC A03/MF A01 CSCL 01A

The static longitudinal stability characteristics of a 0.09 scale model of an airplane with a modified 17 percent thick supercritical wing were investigated. Modifications were made to the wing to reduce a gradual buildup of boundary layer shock loss preceding drag divergence (drag creep) noted in an earlier investigation. The longitudinal aerodynamic characteristics were determined over a Mach number range from 0.30 to 0.76 at angles of attack that generally provided a lift coefficient range from 0 to buffet onset. Results indicate that the modifications to the airfoil essentially eliminated the drag creep associated with the airfoil that occurs between the critical Mach number and the drag divergence Mach number. M.G.

N83-11082*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

APPLICATION OF A SUPERCRITICAL WING TO AN EXECUTIVE-TYPE JET TRANSPORT MODEL

Dennis W. Bartlett Oct. 1975 257 p refs (NASA-TM-X-3251; L-9939; NAS 1.15:X-3251) Avail: NTIS HC A12/MF A01 CSCL 01A

An investigation was conducted in the Langley 8-foot transonic pressure tunnel of a 1/9-scale model of an existing executive-type jet transport refitted with a supercritical wing. The supercritical wing had the same sweep as the original airplane wing but had maximum thickness-chord ratios 33 percent larger at the mean geometric chord and almost 50 percent larger at the wing-fuselage juncture. Force and moment data are presented at Mach numbers from 0.25 to 0.90 at angles of attack that generally vary from -2 to 10 deg. Wing and fuselage pressure distributions are also presented for conditions near the cruise lift coefficient. M.G.

N83-11083*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TRANSONIC AERODYNAMIC CHARACTERISTICS OF THE 10-PERCENT-THICK NASA SUPERCRITICAL AIRFOIL 31

Charles D. Harris Mar. 1975 138 p refs (NASA-TM-X-3203; L-9841; NAS 1.15:X-3203) Avail: NTIS HC A07/MF A01 CSCL 01A

Refinements in a 10 percent thick supercritical airfoil (airfoil 31) have produced significant improvements in the drag characteristics compared with those for an earlier supercritical airfoil (airfoil 12) designed for the same normal force coefficient of 0.7. Drag creep was practically eliminated at normal force coefficients between about 0.4 and 0.7 and was greatly reduced at other normal force coefficients. Substantial reductions in the drag levels preceding drag divergence were also achieved at all normal force coefficients. The Mach numbers at which drag diverges were delayed for airfoil 31 at normal force coefficients up to about 0.6 (by approximately 0.01 and 0.02 at normal force coefficients of 0.4 and 0.6, respectively) but drag divergence occurred at slightly lower Mach numbers at higher normal force coefficients. Author

N83-11084*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AERODYNAMIC CHARACTERISTICS OF AN 11-PERCENT-THICK SYMMETRICAL SUPERCRITICAL AIRFOIL AT MACH NUMBERS BETWEEN 0.30 AND 0.85

James A. Blackwell, Jr. Jul. 1969 42 p refs (NASA-TM-X-1831; NAS 1.15:X-1831) Avail: NTIS HC A03/MF A01 CSCL 01A

The aerodynamic characteristics of an 11 percent thick symmetrical supercritical airfoil were determined in an 8 foot transonic pressure tunnel over a Mach number range of 0.30 to 0.85. The Reynolds number of the tests, based on the airfoil chord, varied with Mach number over a range of 360 million to 774 million. The geometric angle of attack varied from -0.5 to 10.5 deg. The abrupt drag rise for the supercritical airfoil at zero normal force conditions occurs at a Mach number just above 0.82. The corresponding drag rise Mach number for a conventional NACA 0012 airfoil is approximately 0.70. At zero normal force conditions, the level of supervelocity over the supercritical airfoil is considerably reduced from that for the NACA 0012 airfoil. Also, the shock wave for the supercritical airfoil is substantially weaker than that for the NACA 0012 airfoil. For a Mach number of 0.82 and zero normal force, the flow over the present airfoil is supercritical; however, there is no discernible shock wave in the flow, indicating near isentropic recompression. S.L.

N83-11085*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF LANDING GEAR, SPEED BRAKE AND PROTUBERANCES ON THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF AN NASA SUPERCRITICAL-WING RESEARCH AIRPLANE MODEL

Dennis W. Bartlett and Guiliana Sangiorgio Jul. 1975 55 p refs (NASA-TM-X-72684; NAS 1.15:X-72684) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation was conducted in the Langley Research Center 8-foot transonic pressure tunnel to determine the effects of the landing gear, speed brake and the major airplane protuberances on the longitudinal aerodynamic characteristics of an 0.087-scale model of the TF-8A supercritical-wing research airplane. For the effects of the landing gear and speed brake, tests were conducted at Mach numbers of 0.25 and 0.35 with a flap deflection of 20 degrees and a horizontal-tail angle of -10 degrees. These conditions simulated those required for take-off and landing. The effects of the protuberances were determined with the model configured for cruise (i.e., horizontal-tail angle of -2.5 degrees and no other control deflection), and these tests were conducted at Mach numbers from 0.50 to 1.00. The angle-of-attack range for all tests varied from about -5 degrees to 12 degrees. Author

N83-11086*# Iowa Inst. of Hydraulic Research, Iowa City.

MEASUREMANTS IN THE WAKE OF AN INFINITE SWEPT AIRFOIL

C. J. Novak and B. R. Ramaprian Apr. 1982 150 p refs (Grants NsG-1200; NAG2-110) (NASA-CR-169464; NAS 1.26:169464; PB82-212499; IIHR-240) Avail: NTIS HC A07/MF A01 CSCL 01A

This is a report of the measurements in the trailing edge region as well as in the report of the developing wake behind a swept NACA 0012 airfoil at zero incidence and a sweep angle of 30 degrees. The measurements include both the mean and turbulent flow properties. The mean flow velocities, flow inclination and static pressure are measured using a calibrated three-hole yaw probe. The measurements of all the relevant Reynolds stress components in the wake are made using a tri-axial hot-wire probe and a digital data processing technique developed by the authors. The development of the three dimensional near-wake into a nearly two dimensional far-wake is discussed in the light of the experimental data. A complete set of wake data along with the data on the initial boundary layer in the trailing edge region of the airfoil are tabulated in an appendix to the report. Author (GRA)

N83-11087# Army Natick Research and Development Command, Mass. Aero-Mechanical Engineering Lab.

BALLOON-SKIRT AIRBAGS AS AIRDROP SHOCK ABSORBERS:

PERFORMANCE IN VERTICAL DROPS Technical Progress Report, Jun. 1980 - Jul. 1981
William Nykvist Dec. 1981 50 p refs
(DA Proj. 1L1-62210-D-283)
(AD-A118228; NATICK/TR-82/026) Avail: NTIS HC A03/MF A01 CSCL 15/7

A set of 8 balloon-skirt airbags was obtained from Bertin & Cie, France. These airbags were designed to dissipate impact energy of the 8 m/s vertical impact due to parachute airdrop, and provide a ground slide feature to dissipate horizontal velocity. A test platform was designed and fabricated. Forty-three vertical drops were carried out, with mass ranging from 970 to 2390 kg and impact velocity from 5.5 to 8 m/s. Platform position and acceleration, and selected airbag pressures were recorded vs time for each drop; high speed motion picture coverage was provided for many drops. Variation of platform acceleration with load mass and impact velocity was determined for two choke sizes. The airbags exhibited premature skirt crush which would adversely affect ground slide. Average platform acceleration levels ranged from 3.6 to 8.7 G, but peak accelerations were generally twice as high, ranging from 6.8 to 17.7 G. Author (GRA)

N83-11088# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TRANSONIC TEST ON THE BALLISTIC RANGE
Zheng Zhichu, Wang Xigi, Wang Jiurui, Li Binglu, Hau Zhong, Zhang Zhensong, Ge Xuezheu, Zeng Jianguo, Zhang Zengxin, and Ma Wenju 6 Jul. 1982 15 p refs Transl. into ENGLISH from Acta Mechanica Sinica (Communist China), no. 6, 1981 p 619 - 625
(AD-A118262; FTD-ID(RS)T-0620-82) Avail: NTIS HC A02/MF A01 CSCL 20/4

Techniques used on a two-stage light gas gun include the filling gas launching technique, which can be used to reach a subsonic projectile velocity range, and the low filling condition which can launch projectiles to reach transonic and supersonic velocity regions. Clear photographs of flow field around spheres in transonic cases were obtained. Compared with supersonic and hypersonic flows, the standoff distance of a shock wave, the position of the separation point, the neck width and the wake are apparently quite different. Two photographs of the entire flow field at M = 1.01 and M = 0.99 are presented. GRA

N83-11089# Air Force Flight Test Center, Edwards AFB, Calif.
AERODYNAMIC CHARACTERISTICS OF THE AFFTC NOSE-BOOM INSTRUMENTATION UNIT, VOLUME 1 Final Report
Kenneth Rawlings, III and Mark T. Korsmo Mar. 1982 107 p refs 2 Vol.
(AD-A118315; AFFTC-TIM-81-2-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 01/3

This technical information memorandum presents the results and data from wind tunnel calibration of the flow-angle sensing portion of the Air Force Flight Test Center noseboom instrumentation unit. Analysis of the data from the NASA/Ames Research Center 11- by 11-foot and 9- by 7-foot wind tunnels is presented along with fairings resulting from the analysis. The data fairings, which present error in sensed angle of attack and sensed angle of sideslip as a function of Mach number, angle of attack, and angle of sideslip, are summarized and compared extensively with the data. Computer software incorporating the data fairings in a concise form for data reduction routines and the software documentation are included. Volume 1 of this memorandum includes discussion of the analysis, data fairings, fairing-to-data comparisons, software and software documentation. Volume 2 is a run schedule and complete listing of the NASA/ARC original wind tunnel data. Author (GRA)

N83-11090# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF PERFORMANCE OF SUPERSONIC EJECTOR NOZZLES
Shen Huili and Chen Zhongging 21 Jul. 1982 20 p refs Transl. into ENGLISH of Attachment to IR-1-572-0090-79 (China), 1979 p 51-63 and 1 unnumbered page
(AD-A118279; FTD-ID(RS)T-0347-82) Avail: NTIS HC A02/MF A01 CSCL 20/4

An analytical method for calculating the flow field and performance of supersonic ejector nozzles is presented. The calculations involve the real sonic line at the exit of the primary nozzle, the inviscid primary flow field, the correction for the viscosity effect, the pumping characteristic, and the thrust characteristic. L.F.M.

N83-11091# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
THE INFLUENCE OF BLADE TIP GEOMETRY ON THE UNSTEADY PRESSURE DISTRIBUTION OF A ROTOR BLADE. PART 1: RECTANGULAR TIP
Karl Kienappel Mar. 1982 72 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-82-11) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 26,50

The influence of various blade tip geometries on the tip vortex of a harmonically oscillating helicopter was investigated experimentally. The basic shape is a common rectangular tip. An introduction to the problem is given as well as a description of the experimental test setup and the measurement technique. The experimental results of the basic configuration are discussed. Parameters are angle of attack, oscillating frequency, amplitude, and Reynolds number. The cases of leading edge separation and dynamic stall are included. The results show that the maximum unsteady pressure coefficients occur at fully or partially separated flow. Author (ESA)

N83-11092# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
NUMERICAL AND EXPERIMENTAL INVESTIGATION OF THE AERODYNAMICS OF DOUBLE MEMBRANE SAILWING AIRFOIL SECTIONS
R. G. denBoer Feb. 1982 64 p refs
(VTH-LR-345) Avail: NTIS HC A04/MF A01

A simple numerical method which can estimate the performance of both slightly and highly cambered double membrane sailwing profiles is presented. Elasticity is taken into account. A parameter study was performed and the numerical results were verified. Wind tunnel tests on a two dimensional model were carried out. The lift coefficient, C sub l, was determined from static pressures at the wind tunnel side walls. The drag coefficient was found with a wake rake. For each test, the shape of the airfoil was photographed and the pressure inside the profile was measured. Besides proving the numerical method, results show that the maximum value of the lift to drag ratio is 88.6, occurring at C sub l = 1.88, which is much higher than the values for all the other sailwings in the literature. Author (ESA)

N83-11036# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF THE LIFT DISTRIBUTION AND AERODYNAMIC DERIVATIVES OF QUASI-STATIC ELASTIC AIRCRAFT
Liu Qiangang, Wu Changlin, and Jian Zheng *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 1-19 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

N83-11044# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AERODYNAMIC COEFFICIENT IDENTIFICATION OF TIME-VARYING AIRCRAFT SYSTEM AND ITS APPLICATION
Wang Tong *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 109-123 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-11093# Committee on Government Operations (U. S. House).
AIRCRAFT CABIN SAFETY STAFFING STANDARDS
Washington GPO 1981 32 p refs Presented by the Comm. of the Whole House on the State of the Union, 97th Congr., 1st Sess., 11 Dec. 1981
(H-Rept-97-394; GPO-87-604) Avail: US Capital, House Document Room

The many emergency conditions handled by flight attendants are listed and that portion of one company's manual showing flight attendants' assignments for evacuating a Boeing 727 aircraft is presented. The background for current FAA regulations pertaining to the number of flight attendants required aboard passenger-carrying aircraft is given and the implications of a proposed ammendment to base the number of required staff on the number of passengers rather than on the seating capacity of the aircraft are examined. Issues discussed include: (1) passenger location and evaculation; (2) the possibility of concurrent exemptions; (3) substitution of rule making for current exemption process; and (4) the economic justification for the proposal. The committee found no empirical evidence to support the FAA's claim that safety would not be affected, and recommended that the proposed ammendment to 14 CFR 121.391 be withdrawn. A.R.H.

N83-11094# Committee on Government Operations (U. S. House).
AIRCRAFT CABIN SAFETY STAFFING STANDARDS
Washington GPO 1981 546 p Hearing before a Subcomm. of the Comm. on Govt. Operations, 97th Congr., 1st Sess., 6 Apr. 1981
(GPO-77-969) Avail: Committee on Government Operations

Potential adverse effects of changes to regulations that would permit airlines to reduce the normally required number of cabin safety personnel by changing the cabin configuration for seating peru purposes in certain instances are examined. Flight service handbooks and emergency procedures for commercial aircraft are included as well as statements and letters submitted by flight attendants, and representatives of the FAA, the Air Transport Association of America, the National Transportation Safety Board, and the International Association of Fire Fighters. A.R.H.

N83-11095*# Lockheed-California Co., Burbank.
ASSESSMENT OF CRASH FIRE HAZARD OF LH SUB 2 FUELED AIRCRAFT Final Report, Aug. 1980 - Sep. 1981
G. D. Brewer, G. Wittlin, E. F. Versaw, R. Parmley, R. Cima, and E. G. Walther Dec. 1981 199 p refs Sponsored in part by Lockheed Missiles and Space Co., Inc. and The John Muir Inst., Nevada Univ.
(Contract NAS3-2483)
(NASA-CR-165525; NAS 1.26:165525; LR-30060) Avail: NTIS HC A09/MF A01 CSCL 01C

The relative safety of passengers in LH2 - fueled aircraft, as well as the safety of people in areas surrounding a crash scene, has been evaluated in an analytical study. Four representative circumstances were postulated involving a transport aircraft in which varying degrees of severity of damage were sustained. Potention hazard to the passengers and to the surroundings posed by the spilled fuel was evaluated for each circumstance. Corresponding aircraft fueled with liquid methane, Jet A, and JP-4 were also studied in order to make comparisons of the relative safety. The four scenarios which were used to provide a basis for the evaluation included: (1) a small fuel leak internal to the aircraft, (2) a survivable crash in which a significant quantity of fuel is spilled in a radial pattern as a result of impact with a stationary object while taxiing at fairly low speed, (3) a survivable crash in which a significant quantity of fuel is spilled in an axial pattern as a result of impact during landing, and (4) a non-survivable crash in which a massive fuel spill occurs instantaneously. Author

N83-11096*# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.
HEAT GENERATION IN AIRCRAFT TIRES UNDER FREE ROLLING CONDITIONS Final Report
Samuel K. Clark and Richard N. Dodge Washington NASA Oct. 1982 100 p refs
(Grant NsG-1607)
(NASA-CR-3629; NAS 1.26:3629) Avail: NTIS HC A05/MF A01 CSCL 01C

A method was developed for calculating the internal temperature distribution in an aircraft tire while free rolling under load. The method uses an approximate stress analysis of each point in the tire as it rolls through the contact patch, and from this stress change the mechanical work done on each volume element may be obtained and converted into a heat release rate through a knowledge of material characteristics. The tire cross-section is then considered as a body with internal heat generation, and the diffusion equation is solved numerically with appropriate boundary conditions of the wheel and runway surface. Comparison with data obtained with buried thermocouples in tires shows good agreement. Author

N83-11097*# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE OPTIMIZATION OF AIRCRAFT SEAT CUSHION FIRE-BLOCKING LAYERS. FULL SCALE: TEST DESCRIPTION AND RESULTS Final Report, Sep. 1981 - Sep. 1982
Kenneth J. Schutter and Fred E. Duskin May 1982 233 p refs
(Contract NAS2-11095)
(NASA-CR-166418; NAS 1.26:166418; MDC-J2525) Avail: NTIS HC A11/MF A01 CSCL 01C

Full-scale burn tests were conducted on thirteen different seat cushion configurations in a cabin fire simulator. The fire source used was a quartz lamp radiant energy panel with a propane pilot flame. During each test, data were recorded for cushion temperatures, radiant heat flux, rate of weight loss of test specimens, and cabin temperatures. When compared to existing passenger aircraft seat cushions, the test specimens incorporating a fire barrier and those fabricated from advance materials, using improved construction methods, exhibited significantly greater fire resistance. A.R.H.

N83-11098*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AVOIDANCE MANEUEVERS SELECTED WHILE VIEWING COCKPIT TRAFFIC DISPLAYS
J. D. Smith, Stephen R. Ellis, and Edward Lee Oct. 1982 37 p refs
(NASA-TM-84269; A-8992; NAS 1.15:84269) Avail: NTIS HC A03/MF A01 CSCL 01C

Ten airline pilots rates the collision danger of air traffic presented on cockpit displays of traffic information while they monitored simulated departures from Denver. They selected avoidance maneuvers when necessary for separation. Most evasive maneuvers were turns rather than vertical maneuvers. Evasive maneuvers chosen for encounters with low or moderate collision danger were generally toward the intruding aircraft. This tendency lessened as the perceived threat level increased. In the highest threst situations pilots turned toward the intruder only at chance levels. Intruders coming from positions in front of the pilot's own ship were more frequently avoided by turns toward than when intruders approached laterally or from behind. Some of the implications of the pilots' turning-toward tendencies are discussed with respect to automatic collision avoidance systems and coordination of avoidance maneuvers of conflicting aircraft. Author

N83-11099# Dayton Univ., Ohio.
DAYTON AIRCRAFT CABIN FIRE MODEL, VERSION 3. VOLUME 2: PROGRAM USER'S GUIDE AND APPENDICES Final Report, 1 Apr. 1980 - 31 Mar. 1981
Charles D. MacArthur Atlantic City, N.J. FAA Jun. 1982 207 p refs 2 Vol.
(Contract DOT-FA74WA-3532)
(AD-A118390; FAA-CT-81-69-Vol-2; UDRI-TR-81-160-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 01/2

This third version of the Dayton Aircraft Cabin Fire Model (DACFIR) is refinement and generalization of earlier mathematical models for the computer simulation of fire growth in the cabin of a commercial transport airplane. The model uses data from laboratory tests on the cabin furnishing materials and a zone (control volume) representation for the cabin atmosphere to predict the accumulation of heat, smoke, and gases resulting from arbitrary ignition sources specified in the program input. The major improvements are a revised cabin atmosphere model which allows for multiple compartments and the prescribed entry of exterior fire gases, and an implicit numerical integration technique for the atmosphere equations. A user's guide and listing of the computer code are presented. GRA

N83-11100# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

DIRECT LIGHTNING STRIKES TO AIRCRAFT M.S. Thesis

Jeffrey S. Schowalter Jun. 1982 122 p refs

(AD-A118075; AFIT/GE/EE/82J-12) Avail: NTIS HC A06/MF A01 CSCL 01/2

Two direct lightning strikes to a NOAA WC-130 aircraft equipped with eleven electromagnetic field sensors were recorded in South Florida during the summer of 1981. In both cases, the aircraft was flying in precipitation at an altitude of about 4 km and a few kilometers away from active thunderstorm regions. An analysis of the data shows that both strikes exhibit a train of discrete pulses which can be correlated in most of the eleven sensors. The flashes lasted 295 and 460 msec and were characterized by an initial active period of about 40 msec with a pulse repetition rate of ten pulses per millisecond. In both flashes the most of the current flow was along the fuselage with peak currents estimated at 3 KA in one flash and 600 A in the other flash. A continuing current of an estimated 50 A was evident in only one strike. The electric field sensors recorded a maximum change of 200,000 V/M. In one flash the leader appears to propagate from the cloud to the aircraft with a duration of 350 microsecond which implies a distance of about 175 m to the cloud charge center. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-11101*# Analytical Mechanics Associates, Inc., Mountain View, Calif.

MODELING METHODOLOGY FOR MLS RANGE NAVIGATION SYSTEM ERRORS USING FLIGHT TEST DATA

Mehebub S. Karmali and Anil V. Phatak Apr. 1982 33 p refs (Contract NAS2-10670)

(NASA-CR-166411; AMA-82-19; NAS 1.26:166411) Avail: NTIS HC A03/MF A01 CSCL 17G

Flight test data was used to develop a methodology for modeling MLS range navigation system errors. The data used corresponded to the constant velocity and glideslope approach segment of a helicopter landing trajectory. The MLS range measurement was assumed to consist of low frequency and random high frequency components. The random high frequency component was extracted from the MLS range measurements. This was done by appropriate filtering of the range residual generated from a linearization of the range profile for the final approach segment. This range navigation system error was then modeled as an autoregressive moving average (ARMA) process. Maximum likelihood techniques were used to identify the parameters of the ARMA process. Author

N83-11102*# Analytical Mechanics Associates, Inc., Mountain View, Calif.

SENSITIVITY ANALYSIS OF HELICOPTER IMC DECELERATING STEEP APPROACH AND LANDING PERFORMANCE TO NAVIGATION SYSTEM PARAMETERS

Mehebub S. Karmali and Anil V. Phatak Apr. 1982 81 p refs Sponsored in part by Army (Contract NAS2-10670)

(NASA-CR-166412; NAS 1.26:166412; AMA-82-18) Avail: NTIS HC A05/MF A01 CSCL 17G

Results of a study to investigate, by means of a computer simulation, the performance sensitivity of helicopter IMC DSAL operations as a function of navigation system parameters are presented. A mathematical model representing generically a navigation system is formulated. The scenario simulated consists of a straight in helicopter approach to landing along a 6 deg glideslope. The deceleration magnitude chosen is 03g. The navigation model parameters are varied and the statistics of the total system errors (TSE) computed. These statistics are used to determine the critical navigation system parameters that affect the performance of the closed-loop navigation, guidance and control system of a UH-1H helicopter. Author

N83-11103# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

PERFORMANCE OF AIR TRAFFIC CONTROL SPECIALISTS (ATCS'S) ON A LABORATORY RADAR MONITORING TASK: AN EXPLORATORY STUDY OF COMPLACENCY AND A COMPARISON OF ATCS AND NON-ATCS PERFORMANCE

Richard I. Thackray and R. Mark Touchstone Apr. 1982 11 p refs

(AD-A118239; FAA-AM-82-1) Avail: NTIS HC A02/MF A01 CSCL 05/10

The role of the air traffic control specialist (ATCS) is proposed highly automated air traffic systems of the future is currently receiving considerable attention. At the present time, a prevalent conception of the controller's role in such systems is that of a 'systems monitor' or 'systems manager.' Inherent in this view is the belief that the role of the future controller will be less that of an active planner and more that of a passive responder to alternative courses of action presented by the computerized system. Such a change in role has raised concerns that increased controller complacency, inattentiveness, boredom, and reduced readiness to react in emergencies may become serious problems in some of the systems being planned. A complex monitoring task was used to study the effect of complacency on attentional processes. The task was designed to approximate an automated air traffic control radar system. Sixteen experienced ATCS's were tested over a 2-hour session, with half assigned to a subject-controlled and half to a computer-controlled condition. Although the subject-controlled appeared to be generally superior to the computer-controlled condition, the differences in target detection time were not significant. Additional comparisons of ATCS's with non-ATCS's on the radar monitoring task, revealed that ATCS's were significantly superior to non-ATCS's in target detection time, number of targets detected, and rated attentiveness. GRA

N83-11104# Federal Aviation Administration, Atlantic City, N.J. Technical Center.

COMPARISON OF THE MODE S SYSTEM TO THE AUTOMATED RADAR TERMINAL SYSTEM (ARTS) WITH RESPECT TO RANGE AND AZIMUTH RESOLUTION Interim Report, Sep. 1980 - Apr. 1981

Joseph J. Brady and James L. McMillen Washington Jul. 1982 40 p refs

(FAA Proj. 034-243-510)

(AD-A118247; FAA-CT-82-38; FAA-RD-82-35) Avail: NTIS HC A03/MF A01 CSCL 17/7

A series of flight tests were conducted at the Federal Aviation Administration Technical Center to compare the range and azimuth resolution capabilities of the Mode S (formerly the Discrete Address Beacon System (DABS)), in the Air Traffic Control Radar Beacon

/System (ATCRBS) mode, to an existing Automated Radar Terminal System (ARTS) III. The minimum achievable range and azimuth separation of two aircraft, without garbling of either aircraft's A-Code, was determined for both systems. The resolution results were compared to positional aircraft separation data, collected concurrently by a precision Range Instrumentation System, to determine the relationship between A-Code garbling and aircraft separation. The flight test results indicate that the 89 percent beacon resolution achieved the correlated-only Mode S sensor has the best overall resolution in the aircraft separation intervals of 0 deg to 2 deg in azimuth and 0 to 10,000 feet in range. The combined correlated and uncorrelated Mode S reports were 80 percent resolved, whereas, the ARTS reports for the same aircraft separation intervals were 62 percent resolved. The minimum achievable range separation, without garbling, was approximately 10,000 feet for both systems. The azimuth separation was 2 deg for the Mode S system and 3.2 for the ARTS system. GRA

N83-11105# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

APPLICATION OF OUTPUT PREDICTIVE ALGORITHM CONTROL TO A TERRAIN FOLLOWING AIRCRAFT SYSTEM M.S. Thesis

Michael E. Bise Mar. 1982 118 p refs
(AD-A118038; AFIT/GE/EE/82M-1) Avail: NTIS HC A06/MF A01 CSCL 17/7

An effective automatic terrain following command generation system is required to safely maintain a desired clearance altitude above the terrain. For survivability, the aircraft must penetrate at transonic or high subsonic speeds at very low altitudes above ground level. This introduces new problems such as wind gusts, a faster radar update of the terrain, faster aircraft response time, and increased pilot workload. To ensure survivability, a control algorithm must be capable of interpreting all of the above input data and perform flawlessly during a terrain following mission. This report uses the terrain following scenario to evaluate a new digital controller, the Output Predictive Algorithmic Controller. This controller was able to track, during low level penetration, actual terrain data using as an aircraft model the F-111/MAW (Mission Adaptive Wing). The F-111/MAW was chosen for this study due to its direct lift capability. Two wing sweeps (35 degrees and 58 degrees) were chosen to evaluate the effectiveness of direct lift during terrain following missions. Author (GRA)

N83-11106# Federal Aviation Administration, Atlantic City, N.J.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM LOGIC EVALUATION. VOLUME 1: UNEQUIPPED THREAT PHASE Final Report, Mar. - Dec. 1981

Barry R. Dillmann Jul. 1982 74 p
(AD-A118256; DOT/FAA/CT-82/52-Vol-1; DOT/FAA/RD-82/30-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 01/2

The purpose of this report is to characterize the performance of the Traffic Alert and Collision Avoidance System (TCAS) logic which was developed by the Mitre Corporation. The evaluation was based on baseline logic documentation and logic changes made between January to October 1981. The report is the first part of a three-volume series and reflects the evaluation of logic performance using the Fast-Time Encounter Generator as the logic test bed for unequipped threats. The study was conducted in two phases. The initial phase addressed the identification and correction of logic flaws. After the improvements in the logic were coordinated with are provided by Mitre, the second phase assessed the TCAS logic performance for a wide variety of two-aircraft encounters. The report identifies the logic deficiencies and the results of the analysis. In general, TCAS logic performance was excellent. Author (GRA)

N83-11107# Anacapa Sciences, Inc., Santa Barbara, Calif.

IMPORTANCE OF TOPOGRAPHIC FEATURES AND TACTICAL ANNOTATIONS ON MAPS USED BY ARMY AVIATORS FOR NAP-OF-THE-EARTH FLIGHT Interim Technical Report, Aug. 1981 - Jan. 1982

Steven P. Rogers Jan. 1982 51 p
(Contract DAAK80-81-C-0089)
(AD-A118101; USAAVRADCOM-81-0089-1; Rept-459-1) Avail: NTIS HC A04/MF A01 CSCL 05/8

This report describes a survey conducted to assist in the definition of requirements for the display of topographic and tactical information for Army aviators. The introductory section of the report describes Army Aviation tasks, difficulties with map use in the performance of these tasks, and the solution of these difficulties through the development of a computer-generated topographic display system. The general objective of the reported project was to support the development of such a computer-based system through identification of the most important topographic and tactical features used in meeting Army aviation mission requirements. One hundred and seven Army aviators participated in the project, completing an extensive survey by rating the importance and frequency of use of specific features. The report presents a series of tables summarizing the results of the project including average importance ratings of each feature, and rankings of features by importance ratings. A discussion of the overall pattern of results is also provided. Author (GRA)

N83-11108# Lincoln Lab., Mass. Inst. of Tech., Lexington.

APPLICATION OF ADVANCED SIGNAL PROCESSING TECHNIQUES TO ANGLE OF ARRIVAL ESTIMATION IN ATC NAVIGATION AND SURVEILLANCE SYSTEMS

J. E. Evans, D. F. Sun, and J. R. Johnson 23 Jun. 1982 383 p refs
(Contracts F19628-80-C-0002; DOT-FA74WAI-461)
(AD-A118306; TR-582; FAA-RD-82-42) Avail: NTIS HC A13/MF A01 CSCL 17/2

This report focuses on the mitigation of multipath and/or incoherent (cochannel) interference on receiving antenna arrays since these phenomenon represent a principal challenge to many existing ATC systems. The improved signal processing techniques considered explicitly assume that interfering signals may be present and estimate the interference parameters (e.g., power and angle of arrival) as well as the desired signal parameters. By thus identifying the nature of the interference, it is then possible to reduce its effects on the desired signal angle of arrival estimates. GRA

N83-11109# Ohio Univ., Athens. Dept. of Electrical Engineering.

PERFORMANCE TESTS RESULTS OF AUTOMATIC DIRECTION FINDER RECEIVER INTERFERENCE SUSCEPTIBILITY Final Report

T. Mullins and R. Luebbers Dec. 1981 101 p refs
(Contract DTFA01-8-C-10072)
(AD-A118438; FAA-RD-81-83) Avail: NTIS HC A06/MF A01 CSCL 17/7

The intent of this effort was to measure the interference susceptibility of present-day ADF equipment and to determine if RTCA and ICAO documents dealing with this subject are still representative. The results of these tests show that the equipment tested meet the specifications of DO-142 Category A. Recent works had indicated that the interference susceptibility characteristics of ADF receivers may be dependent primarily on the absolute level of the undesired signal, and secondarily on the ratio of the desired to the undesired signal. The data presented in this report, however, demonstrated that the interference characteristics of the aircraft ADF system are a function of the ratio of the desired to the undesired signal levels present at the antenna, and are not correlated to the absolute undesired signal levels. Author (GRA)

N83-11110# IIT Research Inst., Annapolis, Md.

MICROWAVE LANDING SYSTEM (MLS) CHANNEL PLANS AND TRAFFIC LOADING Final Report

A. Koshar and J. Smithmyer Washington FAA May 1982 94 p
(AD-A117597; ECAC-CR-82-032; FAA-RD-81-113) Avail: NTIS HC A05/MF A01 CSCL 01/5

A Standard Traffic Loading Model (STLM) was constructed and the pulse traffic within the STLM was determined. Four

proposed channel plans were compared to determine their ability to satisfy the channel requirements within the STLM.
Author (GRA)

N83-11111# Technische Universitaet, Brunswick (West Germany). Inst. fuer Nachrichtentechnik.
TRAFFIC LOADING SIMULATION ON THE DME-BASED AZIMUTH SYSTEM (DAS) Final Report, Aug. 1981
Uwe Kummer Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 28 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-008; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6

Simulation programs were designed in order to study the influence of traffic load for the DME-based azimuth system DAS. They calculate the reply efficiency, as well as the error of distance and azimuth for an airborne unit which is disturbed by other transponders and interrogators. Because of the changed signal format, corrections still have to be made. For use during the field tests, special generators were designed to simulate interrogations and replies of other aircraft. To get previous insight into the effects caused by traffic loading, a hardware test unit was established. It was used to check the old generators and to measure some D/U ratios between desired and undesired signals. The measurements are important for an assessment of the proposed DME/P-channelization. Author (ESA)

N83-11112# Foersvarets Forskingsansalt, Stockholm (Sweden).
REMOTE SENSING TECHNIQUES SUITABLE FOR EXPLORATION AND NAVIGATION IN AND UNDER SEA ICE
Ragnar Thoren 1981 54 p In ENGLISH; FRENCH summary Presented at the Intern. Colloq. on Spectral Signatures of Objects in Remote Sensing, Avignon, France, 8-11 Sep. 1981
(PB82-188541; FOA-B-60002-M7) Avail: NTIS HC A04/MF A01 CSCL 17G

The advantages of satellite navigation during the voyages of the Swedish icebreaker YMER and the Soviet nuclear-powered icebreaker ARTIKA are discussed. Principal responsibilities of the Swedish Space Corporation, new generation satellites, and the development of LORAN C into an aid to navigation on a worldwide scale are described. The importance of visual ice reconnaissance in combination with optical viewing systems in Arctic waters all year long; night vision systems; laser rangefinders; and passive image intensifier goggles are considered. Aspects of underwater technology explored include: hydro-optics; laser depth sounding in the Baltic Sea; the FOA-SUB, a remotely controlled research vehicle; underwater communication; acoustic underwater locating systems; acoustic speed log; subsea drilling platforms and habitats; and satellite laser communications. A.R.H.

N83-11760# National Inst. for Telecommunications Research, Johannesburg (South Africa).
OMEGA NAVIGATOR CONTROL AND COMPUTATION
P. J. Cabion *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 17 p
(For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-11113*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
AN OPTIMAL CONTROL MODEL APPROACH TO THE DESIGN OF COMPENSATORS FOR SIMULATOR DELAY Final Report
S. Baron, R. Lancraft, and A. Caglayan Washington NASA Oct. 1982 119 p refs
(Contract NAS2-10907)
(NASA-CR-3604; NAS 1.26:3604; BBN-5004) Avail: NTIS HC A06/MF A01 CSCL 01C

The effects of display delay on pilot performance and workload and of the design of the filters to ameliorate these effects were investigated. The optimal control model for pilot/vehicle analysis was used both to determine the potential delay effects and to design the compensators. The model was applied to a simple roll tracking task and to a complex hover task. The results confirm that even small delays can degrade performance and impose a workload penalty. A time-domain compensator designed by using the optimal control model directly appears capable of providing extensive compensation for these effects even in multi-input, multi-output problems. M.G.

N83-11114*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPDOT: A COMPUTER PROGRAM FOR THE OPTIMUM PRELIMINARY DESIGN OF A TRANSPORT AIRPLANE
Steven M. Sliwa and P. Douglas Arbuckle Sep. 1980 110 p refs
(NASA-TM-81857; NAS 1.15:81857) Avail: NTIS HC A06/MF A01 CSCL 01C

A description of a computer program, OPDOT, for the optimal preliminary design of transport aircraft is given. OPDOT utilizes constrained parameter optimization to minimize a performance index (e.g., direct operating cost per block hour) while satisfying operating constraints. The approach in OPDOT uses geometric descriptors as independent design variables. The independent design variables are systematically iterated to find the optimum design. The technical development of the program is provided and a program listing with sample input and output are utilized to illustrate its use in preliminary design. It is not meant to be a user's guide, but rather a description of a useful design tool developed for studying the application of new technologies to transport airplanes. Author

N83-11115*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A TRANSPORT CONFIGURATION HAVING A 42 DEG SWEPT SUPERCRITICAL AIRFOIL WING AND THREE TAIL HEIGHT POSITIONS
Paul G. Fournier and William C. Sleeman, Jr. Dec. 1974 56 p refs
(NASA-TM-X-3149; L-9852; NAS 1.15:X-3149) Avail: NTIS HC A04/MF A01 CSCL 01C

A low speed investigation was conducted in the Langley V/STOL tunnel to define the static stability characteristics of an advanced high subsonic speed transport aircraft model in the cruise configuration (no high lift system). The wing of the model had 42 deg sweep of the quarter chord line, an aspect ratio of 6.78, and supercritical airfoil sections. Three different horizontal tail configurations (high, mid, and low) were investigated on the complete model and for the model with the wing removed in order to assess effects of the wing flow field on the tail contributions to both longitudinal and lateral stability characteristics. All the model configurations investigated were tested over an angle of attack range from approximately -5 to 23 deg. Some model configurations were also tested over an angle of attack range from about 11 to 38 deg in order to explore the aerodynamic characteristics in the deep stall region. M.G.

N83-11116*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF AERODYNAMIC LOAD DISTRIBUTION ON A VARIABLE-WING-SWEEP FIGHTER AIRPLANE WITH A NASA SUPERCRITICAL AIRFOIL
James B. Hallissy and Charles D. Harris Oct. 1974 37 p refs
(NASA-TM-X-3095; L-9146; NAS 1.15:X-3095) Avail: NTIS HC A03/MF A01 CSCL 01C

Wind-tunnel tests have been conducted at Mach numbers of

0.85, 0.88, and 0.90 to determine the aerodynamic load distribution for the 39 deg swept-wing configuration of a variable-wing-sweep fighter airplane with a NASA supercritical airfoil. Chordwise pressure distributions were measured at two wing stations. Also measured were the overall longitudinal aerodynamic force and moment characteristics and the buffet characteristics. The analysis indicates that localized regions of shock-induced flow separation may exist on the rearward portions of the supercritical wing at high subsonic speeds, and caution must be exercised in the prediction of buffet onset when using variations in trailing-edge pressure coefficients at isolated locations. Author

N83-11117*# Kaman Aerospace Corp., Windsor, Conn.
ROTOR DYNAMIC SIMULATION AND SYSTEM IDENTIFICATION METHODS FOR APPLICATION TO VACUUM WHIRL DATA
A. Berman, N. Giansante, and W. G. Flannelly 30 Sep. 1980 188 p refs Sponsored in part by Army Aviation Research and Development Command
(Contract NAS1-13710)
(NASA-CR-159356; NAS 1.26:159356; R-1496) Avail: NTIS HC A09/MF A01 CSCL 01C

Methods of using rotor vacuum whirl data to improve the ability to model helicopter rotors were developed. The work consisted of the formulation of the equations of motion of elastic blades on a hub using a Galerkin method; the development of a general computer program for simulation of these equations; the study and implementation of a procedure for determining physical parameters based on measured data; and the application of a method for computing the normal modes and natural frequencies based on test data. R.J.F.

N83-11118# Boeing Military Airplane Development, Seattle, Wash. Advanced Airplane Branch.
FIRE RESISTANT AIRCRAFT HYDRAULIC SYSTEM Final Report, May 1976 - May 1980
E. T. Raymond, D. W. Huling, R. L. Shick, Jr., E. C. Wagner, and W. E. Willard Wright-Patterson AFB, Ohio AFWAL Jul. 1982 386 p refs
(Contract F33615-76-C-2064; AF Proj. 3145)
(AD-A118169; AFWAL-TR-80-2112) Avail: NTIS HC A17/MF A01 CSCL 11/8

This document reports a study to select a nonflammable hydraulic fluid for possible use in future military aircraft in which the Halocarbon Products Corporation AO-8 chlorotrifluoroethylene (CTFE) fluid was selected as the most promising fluid which meets the specified Aero Propulsion Laboratory and Aeronautical Systems Division nonflammability criteria. It also reports the results of the component compatability tests conducted to evaluate that fluid under typical system conditions. GRA

N83-11119# General Accounting Office, Washington, D. C. Procurement Logistics and Readiness Div.
AIR LAUNCHED CRUISE MISSILE: LOGISTICS PLANNING PROBLEMS AND IMPLICATIONS FOR OTHER WEAPONS SYSTEMS
10 May 1982 12 p refs
(AD-A118129; GAO/PLRD-82-68; B-207053) Avail: NTIS HC A02/MF A01 CSCL 15/5

Document reviewed the integrated logistics support (ILS) planning for the Air Force's air-launched cruise missile (ALCM) and the related B-52 carrier aircraft modifications and identified problems which will inhibit the economy and effectiveness of logistics support for the systems. These problems were primarily caused by the program's concurrent development and production acquisition strategy, which was adopted to meet the required operational availability date for the ALCM. Author (GRA)

N83-11120# Fraunhofer-Inst. fuer Betriebsfestigkeit, Darmstadt (West Germany).
OPERATIONAL LOADS AT NOSE AND MAIN LANDING GEAR OF AN AIRPLANE OF TYPE AIRBUS A 300 B2 DURING NORMAL SERVICE OF THE GERMAN LUFTHANSA Final Report, Jan. 1982
Otto Buxbaum, Volker Ladda, and Joerg Michael Zaschel Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 138 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-010; ISSN-0170-1339) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West German DM 27,50

Measurement and analysis of the operational loads at the main and nose landing gear of a wide body airplane of type Airbus A 300 B2 during normal service are presented. The aim of the investigation was to improve and to complete knowledge on the design loads of modern aircraft landing gears. The loads were analyzed in dependence on the significant load cases. The results are presented as cumulative frequency distributions. In addition, probabilities of occurrence of extreme values are derived with which the loads can be extrapolated to the design life of the airplane. Relations between the load components at main gear and the loads at main and nose gear are determined. Moreover, ground reaction factors were calculated with regard to generalizing the results for the design of landing gears of other airplanes.
Author (ESA)

N83-11121# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
MODERN WING TECHNOLOGY FOR GENERAL AVIATION AIRCRAFT. PHASE 3: FLIGHT TESTING Final Report, Mar. 1981
Heribert Friedel, Wolfgang Haberland, Guenther Halfmann, and Rudolf Matecki Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 121 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-012; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25,50

A general view of the entire research program advanced wing technology (TNT) for general aviation application, a summary of the flight test results, and consideration of economic aspects are presented. The evaluation of the flight tests with the TNT experimental aircraft shows that the flight performances exceed the expectation of calculations and wind tunnel tests by far, and that the flight mechanics are compatible with conventional wing technology. The proof of the economic advantage is presented. The commercial application of advanced wing technology allows significant economic advantages compared to conventional wing aerodynamics and structure. Low fuel cost and high transport efficiency result in a reduction of the direct operating cost by 30% on average compared to existing designs. The outstanding flight test results fully justify the realization of an experimental program. A wing technology was developed for application.
Author (ESA)

N83-11122# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).
DIGITAL SIMULATION OF TRANSONIC 3-DIMENSIONAL FLOWS OF PERFECT COMPRESSIBLE FLOWS AROUND AIRCRAFT BY THE METHODS OF FINITE ELEMENTS AND OF LEAST SQUARES
G. Poirier Nov. 1981 46 p refs In FRENCH; ENGLISH summary Sponsored by French Aeronautics and Astronautics Association (PB82-213448; NT-81-25) Avail: NTIS HC A03/MF A01 CSCL 01C

Gradient algorithms combined with least square formulations are presented and possible computer programs derived from the method for many three dimensional industrial configurations, wing surfaces, air intakes, and complete aircraft are analyzed from the standpoints of data processing capabilities and quality of results. Results of experimental digital calculations are presented in graphic form. A.R.H.

N83-11045# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN ADJUSTMENT METHOD AND ENGINEERING REALIZATION

FOR CONTROL CURVES OF THE 2-VARIABLE FUNCTION
Shao Rongshi *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 124-139 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 01/3

N83-11049# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT AND TECHNICAL LEVEL OF INTERCEPTION PLANES IN THE USSR
Wu Yongzhi *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS) T-0606-82) 15 Jul. 1982 p 1-13 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, 1982 p 2-10 (For primary document see N83-11048 02-01)
Avail: NTIS HC A03/MF A01 CSCL 01/3

N83-11054# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE GENERAL ASSEMBLY AND PAINTING OF THE YIER - 86 PASSENGER PLANE
Wang Zhongzhi *In its* Intern. Aviation (Selected Articles) (FTD-ID (RS)T-0679-82 15 Jul. 1982 p 22-34 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 01/3

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-11123# Arinc Research Corp., Annapolis, Md.
DEVELOPMENT OF AVIONICS INSTALLATION INTERFACE STANDARDS Summary Report, 29 Aug. 1980 - 15 Jun. 1981
Stewart Bailey, Neil Sullivan, and Atso Savisaar Aug. 1981 217 p Revised
(Grant F04606-79-G-0082)
(AD-A116852; Rept-2258-03-2-2477R) Avail: NTIS HC A10/MF A01 CSCL 01/3

This report summarizes ARINC Research Corporation's efforts under Air Force Contract FO4606-79-G-0082, 'Standard Rack-Mounted and Panel-Mounted Avionics Interface Concepts Analysis.' The period of performance was 29 August 1980 through 15 June 1981. The technical areas addressed were the analysis and potential specification of rack-mounted avionics, cockpit-mounted control panels, and panel-mounted instruments. Contract tasks included conceptual studies of potential configurations of a Standard Avionics Integrated Control System (SAICS). The results of the SAICS analyses are reported separately in ARINC Research Publication 2258-02-1-2439, Cost Benefit and Failure Criticality Analyses of the Standard Avionics Integrated Control System (SAICS) Concept, June 1981. The concepts-analysis project described herein continues a contractual effort initiated by the Air Force in 1979 to determine whether a comprehensive Packaging, Mounting, and Environmental (PME) avionics interface standard would benefit Air Force aircraft. Comprehensive findings of that effort are documented in ARINC Research Publication 1753-01-1-2124, Standard Avionics Packaging, Mounting, and Cooling Baseline Study, January 1980, which addresses the applicability of commercial airline avionics to military aircraft, the cost benefits associated with Air Force PME standards, and a possible implementation scenario with recommended activities and schedules. GRA

N83-11124# Anacapa Sciences, Inc., Santa Barbara, Calif.
APPLICATION OF CODING METHODS IN DEVELOPMENT OF SYMBOLOGY FOR A COMPUTER GENERATED TOPOGRAPHIC DISPLAY FOR ARMY AVIATORS Interim Technical Report, Aug. 1981 - Feb. 1982
Marvin C. McCallum and Steven P. Rogers Mar. 1982 130 p refs
(Contract DAAK80-81-C-0089)
(AD-A118142; Rept-459-2; USAAVRADCOM-81-0089-2) Avail: NTIS HC A07/MF A01 CSCL 09/2

This report presents the results of a literature review conducted to identify previous research that could provide guidelines during the initial design of a new symbol system for topographic and tactical data display. Methods of symbol design based on ten dimensions of visual coding -- shape, alphanumeric, size, numerosity, inclination, brightness, color, flash rate, stereo depth, and apparent movement -- are identified and evaluated. The evaluation of alternative coding methods is based on three design-oriented criteria: amount of information conveyed, types of data coded, and aid to operator visual search. These criteria are considered in the review of research investigating both unidimensional and more complex multidimensional symbol systems. A model is presented which identifies the relationships between many factors and symbology system characteristics that ultimately affect the design of symbol systems. Author (GRA)

N83-11394# Royal Signals and Radar Establishment, Malvern (England).
IMAGE GENERATION AND DISPLAY
T. R. Berry *In* AGARD Image Process. Tech. May 1982 25 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-11125*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF STATOR ENDWALL CONTOURING IN A SMALL AXIAL-FLOW TURBINE. 1: STATOR PERFORMANCE
Jeffrey E. Haas Oct. 1982 26 p refs
(NASA-TP-2023; E-1180; NAS 1.60:2023; AVRADCOM-TR-82-C-4) Avail: NTIS HC A03/MF A01 CSCL 21E

Three stator configurations were studied to determine the effect of stator outer endwall contouring on stator performance. One configuration was a cylindrical stator design. One contoured stator configuration had an S-shaped outer endwall, the other had a conical-convergent outer endwall. The experimental investigation consisted of annular surveys of stator exit total pressure and flow angle for each stator configuration over a range of stator pressure ratio. Radial variations in stator loss and aftermixed flow conditions were obtained when these data were compared with the analytical results to assess the validity of the analysis, good agreement was found. A.R.H.

N83-11126*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FILM THICKNESS MEASUREMENT FOR SPIRAL GROOVE AND RAYLEIGH STEP LIFT PAD SELF-ACTING FACE SEALS
Eliseo DiRusso Oct. 1982 21 p refs
(NASA-TP-2058; E-1169; NAS 1.60:2058) Avail: NTIS HC A02/MF A01 CSCL 21E

One Rayleigh step lift pad and three spiral groove self-acting face seal configurations were tested to measure film thickness and frictional torque as a function of shaft speed. The seals were tested at a constant face load of 73 N (16.4 lb) with ambient air at room temperature and atmospheric pressure as the fluid medium. The test speed range was from 7000 to 17,000 rpm. The measured

film thickness was compared with theoretical data from mathematical models. The mathematical models overpredicted the measured film thickness at the lower speeds of the test speed range and underpredicted the measured film thickness at the higher speeds of the test speed range. Author

N83-11127*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
ANALYSIS, DESIGN, FABRICATION AND TESTING OF AN OPTICAL TIP CLEARANCE SENSOR Final Report, Jun. 1979 - Jan. 1981
G. L. Poppel, D. T. F. Marple, and J. D. Kingsley May 1981 84 p refs
(Contract NAS3-21843)
(NASA-CR-165265; NAS 1.26:165265; R81AEG215) Avail: NTIS HC A05/MF A01 CSCL 21E

Analyses and the design, fabrication, and testing of an optical tip clearance sensor with inteded application in aircraft propulsion control systems are reported. The design of a sensor test rig, evaluation of optical sensor components at elevated temperatures, sensor design principles, sensor test results at room temperature, and estimations of sensor accuracy at temperatures of an aircraft engine environment are discussed. Room temperature testing indicated possible measurement accuracies of less than 12.7 microns (0.5 mils). Ways to improve performance at engine operating temperatures are recommended. The potential of this tip clearance sensor is assessed. Author

N83-11128*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ARMY/NASA SMALL TURBOSHAFT ENGINE DIGITAL CONTROLS RESEARCH PROGRAM
J. F. Sellers and A. N. Baez (AVRADCOM Research and Technology Labs., Cleveland, Ohio) 1981 16 p refs Prepared for presentation at the Rotary Wing Propulsion System Specialist Meeting, Williamsburg, Va., 16-18 Nov. 1982; sponsored by the Am. Helicopter Soc.
(NASA-TM-82979; E-1408; NAS 1.15:82979; AVRADCOM-TR-82-C-14; AHSRWP-7) Avail: NTIS HC A02/MF A01 CSCL 21E

The emphasis of a program to conduct digital controls research for small turboshaft engines is on engine test evaluation of advanced control logic using a flexible microprocessor based digital control system designed specifically for research on advanced control logic. Control software is stored in programmable memory. New control algorithms may be stored in a floppy disk and loaded directly into memory. This feature facilitates comparative evaluation of different advanced control modes. The central processor in the digital control is an Intel 8086 16 bit microprocessor. Control software is programmed in assembly language. Software checkout is accomplished prior to engine test by connecting the digital control to a real time hybrid computer simulation of the engine. The engine currently installed in the facility has a hydromechanical control modified to allow electrohydraulic fuel metering and VG actuation by the digital control. Simulation results are presented which show that the modern control reduces the transient rotor speed droop caused by unanticipated load changes such as cyclic pitch or wind gust transients. A.R.H.

N83-11129*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TECHNOLOGY AND BENEFITS OF AIRCRAFT COUNTER ROTATION PROPELLERS
W. C. Strack, G. Knip, A. L. Weisbrich (Hamilton Standard, Windsor Locks, Conn.), J. Godston (Pratt and Whitney Aircraft, East Hartford, Conn.), and E. Bradley (Lockheed-Georgia Co., Marietta, Ga.) 1981 35 p refs
(NASA-TM-82983; E-1414; NAS 1.15:82983) Avail: NTIS HC A03/MF A01 CSCL 01C

Results are reported of a NASA sponsored analytical investigation into the merits of advanced counter rotation propellers for Mach 0.80 commercial transport application. Propeller and gearbox performance, acoustics, vibration characteristics, weight, cost and maintenance requirements for a variety of design parameters and special features were considered. Fuel savings in the neighborhood of 8 percent relative to single rotation configurations are feasible through swirl recovery and lighter gearboxes. This is the net gain which includes a 5 percent acoustic treatment weight penalty to offset the broader frequency spectrum noise produced by counter rotation blading. Author

N83-11130*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL PROGRAM FOR THE EVALUATION OF TURBOFAN/TURBOSHAFT C CONVERSION TECHNOLOGY
J. G. McArdle and L. M. Wenzel 1981 25 p refs Prepared for presentation at the Rotary Wing Propulsion System Specialist Meeting, Williamsburg, Va., 16-18 Nov. 1982; sponsored by Am. Helicopter Soc.
(NASA-TM-82988; E-1420; NAS 1.15:82988; AHS-RWP-19) Avail: NTIS HC A02/MF A01 CSCL 21E

A TF34 turbofan engine is being modified to produce shaft power from an output coupling on the fan disk when variable inlet fuide vanes are closed to reduce fan airflow. The engine, called a convertible engine, could be used on advanced rotorcraft such as X-wing, ABC (Advanced Blade Concept), and Folding Tilt Rotor, and on V/STOL craft in which two engines are cross-coupled. The engine will be tested on an outdoor static test stand at NASA Lewis Research Center. Steady-state tests will be made to measure performance in turbofan, turboshaft, and combined power output modes. Transient tests will be made to determine the response to the engine and a new digital engine control system for several types of rapid changes in thrust and shaft loads. The paper describes the engine modifications, the test facility equipment, proposed testing techniques for several types of tests, and typical test results predicted from engine performance computer programs. Author

N83-11131# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
VISCOELASTIC DAMPING OF TURBINE AND COMPRESSOR BLADE VIBRATIONS M.S. Thesis
Stephen Lee Vest Mar. 1982 81 p refs
(AD-A118135; AFIT/GAE/AA/81D-32) Avail: NTIS HC A05/MF A01 CSCL 21/5

An experimental and an analytical model of a turbine/compressor blade is developed in order to investigate the feasibility of using a viscoelastic material to damper the vibrations of the blade. The experimentally determined response of the blade at various frequencies is studied. In order to make a qualitative comparison of damping effectiveness, the response of a similar model using friction damping is also experimentally studied. A model of a modified cantilever beam is used to develop the equation of motion of the blade and the resulting eigenvalue problem is solved using an iterative technique. An analysis of the rigid body mode is performed. A comparison and an analysis of the results of the experimental and analytical models are delineated. Author

N83-11132# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN AERODYNAMIC DESIGN METHOD FOR TRANSONIC AXIAL FLOW COMPRESSOR STAGE
Fang-Yuan Zhu and Xin-Hai Zhou 21 Jul. 1982 21 p refs Transl. into ENGLISH of attachment to IR-1572-0093-79 (China), 1979 p 37-49
(AD-A118278; FTD-ID(RS)T-0348-82) Avail: NTIS HC A02/MF A01 CSCL 20/4

A three dimensional aerodynamic design method for transonic axial flow compressor stage is described. The method is comprised of three main parts: the mean streamsurface calculation, the approximate calculation of streamsurface of revolution, and defining the blade element on the conical surface and stocking the blade airfoil sections. The method is unusual in that the calculation stations for making the streamsurface calculations are curves and particularly in that the airfoil parameters of blade are calculated on a plane tangent to the streamsurface of revolution. On the

tangential plane, two dimensional flow is used as a basis model to calculate the Mach wave system on the suction surface of cascade entrance region. Author

N83-11133# Rolls-Royce Ltd., Derby (England).
TITANIUM FOR FUEL EFFICIENT GAS TURBINES
P. J. Postans and R. H. Jeal 1982 16 p refs
(PNR-90110) Avail: NTIS HC A02/MF A01

Advantages and disadvantages of using titanium in gas turbine engine compressor rotating disks and blades, stator blades, and casings are summarized. Titanium is used mainly because of its high strength to weight ratio. Titanium alloys are inherently cleaner and freer from defects than steel or nickel alloys. However, its low stiffness makes titanium unsuitable where rigidity is the prime requirement. Wear and frettage resistance of titanium is inferior to that of most steel and nickel alloys. Author (ESA)

N83-11134# Rolls-Royce Ltd., Derby (England). Div. of Operations.
TRIED AND PROVEN ENGINE TECHNOLOGY: A VITAL KEY TO IMPROVING AIRLINE ECONOMICS
Dennis A. Head 1982 11 p
(PNR-90112) Avail: NTIS HC A02/MF A01

It is argued that engine related cost reduction in airline operation will come from the perfecting of current technologies. Drastic changes in engine design, comparable to the introduction of big fan engines in the 1960's, are ruled out. Trends towards increased automation of production, and multinational product development are noted. The need for better management in order to gain maximum benefit from technological advances is stressed. Author (ESA)

N83-11135# Rolls-Royce Ltd., Derby (England). Product Support Div.
ASPECTS OF THE RELIABILITY AND MAINTENANCE OF TURBOPROPS AND LARGE TURBOFAN ENGINES
J. J. Donnelly and K. Goddard Nov. 1981 10 p Conf. held at Belgrade; Sponsored by Belgrade Univ. Faculty of Transport and Traffic Engineering
(PNR-90113) Avail: NTIS HC A02/MF A01

Design features which lead to high reliability in aerc gas turbines, and techniques used to monitor reliability and improve maintenability are discussed. The RB 211 and Dart engines are considered. Dart features include single lever engine control, self contained oil system, readily removable combustion chambers, and a narrow annular intake shielded by the propeller to minimize foreign object ingestion. The RB 211 modular design facilitates maintenance by allowing on-wing functional testing of replaced modules. Condition monitoring and a reliability management plan reduce disruption caused by having to remove engines for maintenance. Author (ESA)

N83-11136# Rolls-Royce Ltd., Derby (England).
THE FUEL EFFICIENT JET ENGINE
D. J. Parfitt 1982 14 p
(PNR-90114) Avail: NTIS HC A02/MF A01

The development of the RB 211 engine modules is described and the ways in which the RB 211 overcomes problems which reduce fuel efficiency are outlined. Low fuel consumption is achieved by keeping installation losses (intake cowl drag, air and power offtakes) low. High component efficiency, with duct losses and leakages from the core engine minimized is sought. The conflict between the high bypass ratio with low maximum cycle temperature for low jet velocity, and high pressure ratio with high maximum cycle temperature for high thermodynamic cycle efficiency, is resolved by running the engine to the highest temperature consistent with achieving an acceptable high pressure turbine blade life. Author (ESA)

N83-11137# Rolls-Royce Ltd., Derby (England).
BLADE PRESSURE MEASUREMENTS
J. W. H. Chivers 1982 21 p
(PNR-90117) Avail: NTIS HC A02/MF A01

Measurement techniques which enable rotating pressures to be measured during the normal operation of a gas turbine on a component test rig are described. Steady and transient blade surface pressure data are obtained by inserting miniature high frequency response pressure transducers into the fan blades of large gas turbines. Steady rotating pressures inside and on the surface of engine or rig turbine blades and rotating pressures in cooling feed systems are measured by low frequency response systems known as the pressure pineapple and the rotating scanivalve. For steady stake measurements the scanivalve is potentially more accurate than the pineapple and can accept more pressure tappings, but the pineapple is simpler to use, and faster. Author (ESA)

N83-11138# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
FLUID DYNAMICS PANEL SYMPOSIUM ON AERODYNAMICS OF POWER PLANT INSTALLATION Technical Evaluation Report
William P. Henderson Jun. 1982 15 p Symp. held at Toulouse, 11-14 May 1981 Prepared in cooperation with NASA. Lewis Research Center
(AGARD-AR-173; ISBN-92-835-1436-2) Avail: NTIS HC A02/MF A01

Powerplant installations involve complex flows, strongly influenced by viscous effects and often with important aerodynamic interactions between the airframe and propulsion system. The introduction of vehicle propulsion concepts, and points of emphasis in aircraft and missile design requirements, provide an expanding range of aerodynamic problems which cal for both experimental and theoretical study. Aerodynamic problems in powerplant installation are surveyed and work which has improved basic understanding or has enhanced prediction and design methods in this field is reviewed. Powerplant installation effects for both combat and transport aircraft are emphasized. S.L.

N83-11041# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SHOCK WAVE BOUNDARY LAYER INTERACTION IN COMPRESSOR CASCADES
Yu Shen *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 75-84 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced at A82-34643 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 21/5

N83-11042# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL STUDY ON DISCHARGE AND LOSS COEFFICIENTS OF COMBUSTOR SWIRLERS
Zhang Chunxia and Wang Yulian *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 85-95 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34644 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 21/5

N83-11050# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF DOUBLE-ROTOR SUPERCHARGED TURBOJET ENGINES IN THE USSR AS SEEN FROM MODELS R11 TO R29
Liu Chunyi *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS)T-0606-82) 15 Jul. 1982 p 16-27 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, 1982 p 2-10 (For primary document see N83-11048 02-01)
Avail: NTIS HC A03/MF A01 CSCL 21/5

N83-11052# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PROBLEMS OF REFITTING AERO-GAS TURBINE ENGINES FOR MULTIPLE USES

Chen Guang *In its* Intern. Aviation (Selected Articles) (FTD-ID(RS) T-0678-82) 15 Jul. 1982 p 1-14 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 21/5

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-11139*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GAIN SELECTION METHOD AND MODEL FOR COUPLED PROPULSION AND AIRFRAME SYSTEMS
Patrick C. Murphy 4 Nov. 1982 33 p refs
(NASA-TP-2067; L-15215; NAS 1.60:2067) Avail: NTIS HC A03/MF A01 CSCL 01C

A longitudinal model is formulated for an advanced fighter from three subsystem models: the inlet, the engine, and the airframe. Notable interaction is found in the coupled system. A procedure, based on eigenvalue sensitivities, is presented which indicates the importance of the feedback gains to the optimal solution. This allows ineffectual gains to be eliminated; thus, hardware and expense may be saved in the realization of the physical controller. Author

N83-11140*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DESIGN OF A HELICOPTER AUTOPILOT BY MEANS OF LINEARIZING TRANSFORMATIONS
G. Meyer, R. L. Hunt, and R. Su Oct. 1982 14 p refs
(NASA-TM-84295; A-9091; NAS 1.15:84295) Avail: NTIS HC A02/MF A01 CSCL 01C

An automatic flight control systems design methods for aircraft that have complex characteristics and operational requirements, such as the powered lift STOL and V/STOL configurations are discussed. The method is effective for a large class of dynamic systems that require multiaxis control and that have highly coupled nonlinearities, redundant controls, and complex multidimensional operational envelopes. The method exploits the possibility of linearizing the system over its operational envelope by transforming the state and control. The linear canonical forms used in the design are described, and necessary and sufficient conditions for linearizability are stated. The control logic has the structure of an exact model follower with linear decoupled model dynamics and possibly nonlinear plant dynamics. The design method is illustrated with an application to a helicopter autopilot design. S.L.

N83-11141*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY AND CONTROL CHARACTERISTICS AT MACH NUMBERS 1.60 TO 2.86 OF A VARIABLE-SWEEP FIGHTER CONFIGURATION WITH SUPERCRITICAL AIRFOIL SECTIONS
Samuel M. Dollyhigh Jun. 1971 82 p refs
(NASA-TM-X-2284; L-7583; NAS 1.15:X-2284) Avail: NTIS HC A05/MF A01 CSCL 01C

Tests were conducted in the Mach number range from 1.60 to 2.86 to determine the longitudinal and lateral aerodynamic characteristics of a variable-sweep fighter configuration with supercritical airfoil sections, twin rectangular inlets, twin vertical tails, and boom-mounted aft horizontal tails. The results indicate that the configuration has longitudinal stability characteristics and a relatively high horizontal-tail control effectiveness. This horizontal-tail effectiveness, coupled with relatively high levels of zero-lift pitching moment, results in a high instantaneous normal-acceleration capability for the configuration at a Mach number of 1.60 and an altitude of 10668 m (35000 ft). The lateral-stability results, however, indicate rather poor directional characteristics for an angle of attack greater than 10 deg. For the Mach number range of the tests, static directional stability was maintained only to angles of attack of 10 deg to 12 deg, which were well below the angles of attack at which the configuration had longitudinal trim capability. A.R.H.

N83-11142*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF LONGITUDINAL AND LATERAL-DIRECTIONAL STABILITY AND CONTROL CHARACTERISTICS OF A 0.237-SCALE MODEL OF A REMOTELY PILOTED RESEARCH VEHICLE WITH A THICK, HIGH-ASPECT-RATIO SUPERCRITICAL WING
Thomas A. Byrdsong and Cuyler W. Brooks, Jr. Jul. 1980 218 p refs
(NASA-TM-81790; L-13389; NAS 1.15:81790) Avail: NTIS HC A10/MF A01 CSCL 01C

A 0.237-scale model of a remotely piloted research vehicle equipped with a thick, high-aspect-ratio supercritical wing was tested in the Langley 8-foot transonic tunnel to provide experimental data for a prediction of the static stability and control characteristics of the research vehicle as well as to provide an estimate of vehicle flight characteristics for a computer simulation program used in the planning and execution of specific flight-research mission. Data were obtained at a Reynolds number of 16.5 x 10 to the 6th power per meter for Mach numbers up to 0.92. The results indicate regions of longitudinal instability; however, an adequate margin of longitudinal stability exists at a selected cruise condition. Satisfactory effectiveness of pitch, roll, and yaw control was also demonstrated. A.R.H.

N83-11143# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DIGITAL FLIGHT CONTROL SYSTEM DESIGN USING SINGULAR PERTURBATION METHODS M.S. Thesis
Joseph S. Smyth Dec. 1981 224 p refs
(AD-A118117; AFIT/EE/GE/81D-55) Avail: NTIS HC A10/MF A01 CSCL 01/3

In this report a single longitudinal tracker is developed for the aircraft for three different flight conditions. The method used is the singular perturbation method applied to fast-sampling, output-feedback digital control. Each flight condition has three command modes: positive pitch pointing, vertical translation and straight climb. A sensitivity study is performed to validate the design and illustrate design parameter influences on system response. A computer-aided-design program, MULTI, is developed to assist in the iterative design process. The program is fully interactive, user-oriented, and provides error protection. The program allows complete design and simulation of three types of control law designs: known-regular plants, known irregular plants, and unknown plants. The report contains a brief but complete summary of each of these control law design methods. A user's manual and a programmer's manual are provided for further development of the program.
Author (GRA)

N83-11144# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND ANALYSIS OF A MULTIVARIABLE, DIGITAL CONTROLLER FOR THE A-7D DIGITAC 2 AIRCRAFT AND THE DEVELOPMENT OF AN INTERACTIVE COMPUTER DESIGN PROGRAM M.S. Thesis
Douglas S. Porter Dec. 1981 106 p refs
(AD-A118134; AFIT/GE/EE/81D-48) Avail: NTIS HC A06/MF A01 CSCL 01/3

A multivariable error-actuated digital tracking controller is developed for the Mach 0.18 flight condition of the A-7D Digitac 2 aircraft using a singular perturbation method. The design is accomplished and simulated after the development of an interactive computer program named MULTI. The complete designed process is presented; a discussion of the robustness of the control law over a range of flight conditions and the effect of an aircraft flight control surface failure is also included. A more accurate aircraft model is required before further testing is accomplished to study

the possibilities of other controller designs. The computer package is available to the engineering community. GRA

N83-11145# Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany). Transport Aircraft Div.
AIRCRAFT WITH REDUCED LONGITUDINAL STABILITY Final Report, Nov. 1981
Bertram Fischer, Burkhard Kiekebusch, August Kroeger, Bernhard Trosky, and Klaus Weise Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 137 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-004; ISSN-0170-1339) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

Yield and effort of a more aft center of gravity (CG), resulting in drag saving effects, were quantified in order to elaborate a reasonable proposition for realizing reduced stability in transport aircraft. Basic work, concerning handling qualities in relation to stability margins, as well as methods to redesign the tailplane, according to the new tasks, are also presented. The trim tank system with integral tailplane (or fin) tank offers a highly flexible solution to cover normal CG movements and rearward flight limits moved aft in development steps. The envisaged stability margins guarantee acceptable handling qualities which, normally, are augmented by artificial means. The fuel and operating cost savings, especially on longer stages, prove the system to be economically attractive. The first implementation of such a system within the Airbus program is planned. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-11146# National Aerospace Lab., Tokyo (Japan). Second Aerodynamics Div.
CONSTRUCTION AND PERFORMANCE OF NAL TWO-DIMENSIONAL TRANSONIC WIND TUNNEL
Feb. 1982 54 p refs
(NAL-TR-647T; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

The construction and the results of initial calibration of a wind tunnel built to meet the requirements of high Reynolds number testing of wing sections at transonic regime are described. The blowdown tunnel has a test section of 0.3 m x 1.0 m. The required capability of this wind tunnel is for Mach numbers ranging from 0.2 to 1.2 and for a Reynolds number up to 40 x 10 to the 16th power at Mach number 0.8 with sufficient running time. The design objectives are outlined and the completed facilities, i.e., the wind tunnel, the instrumentation and operation system, the silencer and auxiliary equipment of the air compressor and the air reservoir, are described. The performance of the tunnel is assessed based on experimental results. High Reynols number testing can be achieved in this wind tunnel without any difficulty. Reynolds number effects on the airfoil characteristics are clarified experimentally. A.R.H.

N83-11147# Arinc Research Corp., Annapolis, Md.
AUTOMATIC CARRIER LANDING SYSTEM (ACLS) CATEGORY 3 CERTIFICATION MANUAL
A. P. Schust, P. N. Young, and W. R. Simpson Jul. 1982 220 p
(Contract N00421-81-C-0187)
(AD-A118181; Rept-1506-01-1-2750) Avail: NTIS HC A10/MF A01 CSCL 01/2

The purpose of this Automatic Carrier Landing System (ACLS) Certification Manual is to give information and guidance for the proper conduct of an ACLS certification. Information contained herein is a compilation of pertinent data, tests, and methods intended to guide the user through the complete planning, testing, and reporting required during a certification effort. Author (GRA)

N83-11148# Instructional Science and Development, Inc., San Diego, Calif.
A LIFE CYCLE COST MODEL FOR AN ELECTRONIC MAINTENANCE TRAINER Special Report, Jan. 1980 - Mar. 1981
Linda J. Mark, Dewey Kribs, John W. Schuler, and James E. Brown Aug. 1982 37 p refs
(Contract N66001-80-C-0090)
(AD-A118435; NPRDC-SR-82-33) Avail: NTIS HC A03/MF A01 CSCL 05/3

This research was conducted in support of the Class 'A' electronic equipment maintenance training system (EEMT) program. This report describes the development of the EEMT life-cycle cost model. Cost data for EEMT planning, programming, and budgeting are provided through cost estimation and work breakdown structures. Author (GRA)

N83-11149# Systems Technology, Inc., Mountain View, Calif.
DETERMINATION OF MOTION AND VISUAL SYSTEM REQUIREMENTS FOR FLIGHT TRAINING SIMULATORS Final Report
Robert K. Heffley, Warren F. Clement, Robert F. Ringland, Wayne F. Jewell, Henry R. Jex, Duane T. McRuer, and Vernon E. Carter Aug. 1981 253 p refs
(Contract MDA903-80-C-0235; DA Proj. 2Q2-63744-A-795)
(AD-A117555; STI-TR-546; ARI-TR-546) Avail: NTIS HC A12/MF A01 CSCL 05/9

Fidelity requirements for Army flight training simulators are explored using a manual control theory approach. The first step is to define 'simulator fidelity' in operational terms which provide a basis for each of the subsequent steps. This definition is accompanied by a taxonomy of measurable fidelity parameters. The next step, also of a preparatory nature, is the analysis of Army flight training missions. Author (GRA)

N83-11150# Kilkeary, Scott and Associates, Inc., Annapolis, Md.
A STATE-OF-THE-ART SURVEY OF THE DEVELOPMENT OF TAXIWAY GUIDANCE AND CONTROL SYSTEMS Final Report
Charles A. Douglas Washington FAA Sep. 1982 41 p refs
(Contracts N68335-80-C-2008: DOT-FA77WAI-786)
(AD-A117520; FAA-RD-81-87) Avail: NTIS HC A03/MF A01 CSCL 01/5

This study consisted of a review and analysis of the historical background of taxiway lighting and marking, its functions and development. The study emphasized the block control system used at Heathrow, the problems associated with manual and automated control of stop, hold and clearance bars, and the problems associated with automated surface movement control. The study provides the present status of developments and recommendations for future research endeavors. Author (GRA)

N83-11151# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
IDENTIFICATION OF EXIT TAXIWAYS (RETROREFLECTIVE MARKERS ONLY) Interim Report, Mar. 1981 - May 1982
Larry W. Hackler Washington Jun. 1982 14 p refs
(FAA Proj. 081-502-540)
(AD-A117487; FAA-CT-82-77) Avail: NTIS HC A02/MF A01 CSCL 01/5

This project is being performed in response to an SRDS request to perform a more extensive evaluation and inservice test of a method using surface retroreflective markers for identifying short-radius exit taxiways (low-speed exits). The markers were installed at the Atlantic City (Federal Aviation Administration Technical Center) Airport. The evaluation provided additional information to help insure that the system will be acceptable to users. This report describes the results and gives plans for conducting the inservice test. Author (GRA)

N83-11152# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Abteilung Theoretische Aerodynamik.

ESTIMATION OF SIMULATION ERRORS AND INVESTIGATIONS OF OPERATING RANGE EXTENSIONS FOR THE EUROPEAN TRANSONIC WIND TUNNEL (ETW) Final Report, Mar. 1981
Bernhard Wagner Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 162 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-003; ISSN-0170-1339) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,50

The influence of viscous effects in combination with real gas effects and heat transfer at not correctly cooled model surfaces was investigated with respect to the simulation accuracy in the planned cryogenic European Transonic Wind tunnel. Changes in separation behavior and skin friction were calculated for the transonic shock wave turbulent boundary layer interaction by solving the full Navier-Stokes equations numerically and for profile flows by use of a nonadiabatic boundary layer method. Both methods include a description of the real gas behavior by the Beattie-Bridgeman equation. The results show no considerable differences for the separation behavior although always small systematic deviations in skin friction occur. In particular, the shock boundary layer interaction process does not exhibit a special sensitivity. Two dimensional calculations for inviscid transonic flows with equilibrium condensations reveal that small amounts of condensate are admissible without affecting the accuracy of the measurements. Author (ESA)

N83-11153# Department of Transportation, Washington, D. C.
AIRPORT DELAY AND IMPROVEMENT STUDY: JOHN F. KENNEDY INTERNATIONAL AIRPORT AND LAGUARDIA AIRPORT
Oct. 1981 28 p
(PB82-195884) Avail: NTIS HC A03/MF A01 CSCL 01E

Air traffic delay in the New York area, its causes, and solutions were studied. Delay reduction measures which reduce the level and costs of delay at John F. Kennedy International and LaGuardia Airports were identified. The cost savings outlined for each airport are not intended to represent absolutes but rather to offer a means for comparing benefits which would accrue should the particular delay reduction measures be implemented. GRA

N83-11037# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PRELIMINARY STUDY ON VARIABLE POROSITY WALLS FOR A TRANSONIC WIND TUNNEL
Zhang Qiwei *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 20-32 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 14/2

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-11154*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Attached Shuttle Payloads Organization.
MATERIALS EXPERIMENT CARRIER CONCEPTS DEFINITION STUDY. VOLUME 1: EXECUTIVE SUMMARY, PART 2 Final Report
17 Dec. 1981 61 p refs 3 Vol.
(Contract NAS8-33688)
(NASA-CR-170644; NAS 1.26:170644; MPS.6-81-221-Vol-1-Pt-2) Avail: NTIS HC A04/MF A01 CSCL 22A

The materials experiment carrier (MEC) is an optimized carrier for near term and advanced materials processing in space (MPS) research and commercial payloads. When coupled with the space platform (SP), the MEC can provide the extended duration, high power and low acceleration environment the MPS payload typically requires. The lowest cost, technically reasonable first step MEC that meets the MPS program missions objectives with minimum programmatic risks is defined. The effectiveness of the initial MEC/space platform idea for accommodating high priority, multidiscipline, R&D and commercial MPS payloads, and conducting MPS payload oprations at affordable funding and acceptable productivity levels is demonstrated. S.L.

N83-11155*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Attached Shuttle Payloads Organization.
MATERIALS EXPERIMENT CARRIER CONCEPTS DEFINITION STUDY. VOLUME 2: TECHNICAL REPORT, PART 2 Final Report
17 Dec. 1981 276 p refs 3 Vol.
(Contract NAS8-33688)
(NASA-CR-170645; NAS 1.26:170645; MPS.6-81-222-Vol-2-Pt-2) Avail: NTIS HC A13/MF A01 CSCL 22A

A materials experiment carrier (MEC) that provides effective accommodation of the given baseline materials processing in space (MPS) payloads and demonstration of the MPS platform concept for high priority materials processing science, multidiscipline MPS investigations, host carrier for commercial MPS payloads, and system economy of orbital operations is defined. The study flow of task work is shown. Study tasks featured analysis and trades to identify the MEC system concept options. S.L.

N83-11156*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
MATERIALS EXPERIMENT CARRIER CONCEPTS DEFINITION STUDY. VOLUME 3: PROGRAMMATICS, PART 2
17 Dec. 1981 29 p refs 3 Vol.
(Contract NAS8-33688)
(NASA-CR-170646; NAS 1.26:170646; MPS.6-81-223-Vol-3-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 22A

Project logic, schedule and funding information was derived to enable decisions to be made regarding implementation of MEC system development. A master schedule and cost and price estimates (ROM) were developed for a project that consists of development of an all-up MEC, its integration with payloads and its flight on one 90 day mission. In Part 2 of the study a simple initial MEC was defined to accommodate three MPS baseline payloads. The design of this initial MEC is illustrated. The project logic, detailed schedules, and ROM cost estimate relate to a project in which this initial MEC is developed, integrated with payloads and flown once for 180 days. S.L.

N83-11157*# Athens Coll., Ala.
SPACE PROCESSING OF ELECTRONIC MATERIALS Final Report
Lawrence R. Holland 28 Sep. 1982 12 p refs
(Contract NAS8-34432)
(NASA-CR-170653; NAS 1.26:170653) Avail: NTIS HC A02/MF A01 CSCL 22A

The bulk growth of solid solution alloys of mercury telluride and cadmium telluride is discussed. These alloys are usually described by the formula Hg1-xCdxTe, and are useful for the construction of infrared detectors. The electronic energy band gap can be controlled between zero and 1.6 electron volts by adjusting the composition x. The most useful materials are at x approximately 20%, suitable for detection wavelengths of about 10 micrometers. The problems of growing large crystals are rooted in the wide phase diagram of the HgTe-CdTe pseudobinary system which leads to exaggerate segregation in freezing, constitutional supercooling, and other difficulties, and in the high vapor pressure of mercury at the growth temperatures, which leads to loss of stoichiometry and to the necessity of working in strong, pressure resistant sealed containers. S.L.

N83-11158*# Grumman Aerospace Corp., Bethpage, N.Y.
SPACE FABRICATION DEMONSTRATION SYSTEM COMPOSITE BEAM CAP FABRICATOR Final Report
Mar. 1982 67 p
(Contract NAS8-32472)

(NASA-CR-170642; NAS 1.26:170642) Avail: NTIS HC A04/MF A01 CSCL 22A

A detailed design for a prototype, composite beam cap fabricator was established. Inputs to this design included functional tests and system operating requirements. All required materials were procured, detail parts were fabricated, and one composite beam cap forming machine was assembled. The machine was demonstrated as a stand-alone system. Two 12-foot-long beam cap members were fabricated from laminates graphite/polysulfane or an equivalent material. One of these members, which as structurally tested in axial compression, failed at 490 pounds. M.G.

N83-11159# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACEFLIGHT (SELECTED ARTICLES)

1 Jul. 1982 24 p Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (AD-A118230; FTD-ID(RS)T-0585-82) Avail: NTIS HC A02/MF A01 CSCL 22/2

Selected articles on spaceflight are presented. The functions and characteristics of spacecraft structural systems are discussed. The improvement of liquid propellants through low temperature research is described. Finally, space tugs and their role in space technology are discussed. For individual titles, see N83-11160 through N83-11162.

N83-11160# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACECRAFT STRUCTURAL SYSTEMS c18

Wu Jiansheng *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 1-7 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)

Avail: NTIS HC A02/MF A01 CSCL 22/2

Spacecraft structural systems hold an important place in the totality of a spacecraft. The general quality of structural design is discussed. The instruments and materials used in spacecraft structures are described in detail. B.W.

N83-11161# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

LIQUID-FUEL ROCKET ENGINE FOOD: DEVELOPMENT AND PROSPECTS FOR LIQUID PROPELLENTS c28

Liu Songwen *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 8-12 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)

Avail: NTIS HC A02/MF A01 CSCL 21/9

One of the materials consumed by rocket engines is called the combustible component (the fuel), and the other is called the oxidant. Together they are called the propellant. If both the oxidant and the combustible component are liquids, it is then called a liquid propellant; if one is solid and the other liquid, then it is called a solid/liquid mixture propellant. Of course the 'food' for a liquid-fuel rocket engine is a liquid propellant. Apart from determining aspects of the design of a liquid fuel rocket engine, the characteristics of a particular liquid propellant are a very significant factor affecting the performance of a liquid fuel rocket engine. These characteristics are discussed in detail. B.W.

N83-11162# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACE TUGS c16

Lin Yiping *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 13-19 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)

Avail: NTIS HC A02/MF A01 CSCL 22/2

The need for space tugs in space technology is discussed. Space tug components are described. The importance of space navigation is discussed. B.W.

N83-11163# Naval Intelligence Support Center, Washington, D.C. Translation Div.

THE JAPANESE SPACE PROGRAM

Jean-Michel Constant 22 Apr. 1982 29 p Transl. into ENGLISH from L'Aeron. et L'Astron. (France), no. 91, 1981 p 54-74 (AD-A118001; NISC-Trans-6799) Avail: NTIS HC A03/MF A01 CSCL 22/2

An overview of the Japanese Space Program is presented. Particular emphasis is given to the MU, N, and H launch vehicles and the space processing and plasma physics experiments planned for flight aboard the Spacelab. The PLANET-A probe rendezvous mission to Halley's comet is also discussed. M.G.

N83-11164# Freiburg Univ. (West Germany). Kristallographisches Inst.

PREPARATION OF A SOLVENT ZONE CRYSTALLIZATION EXPERIMENT OF CADMIUM TELLURIDE DURING THE FIRST SPACELAB PROJECT (FSLP) MISSION Final Report, Apr. 1981

Rudolf Dian and Reinhard Schoenholz Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 33 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie Original contains color illustrations (BMFT-FB-W-82-005; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7

The preparations (purification of starting materials, synthesis of CdTe and shaping of CdTe feed rods, seeds and Te disks) for crystal growth of CdTe by the traveling heater method from a tellurium solvent zone were improved. A method for the preparation of the growth ampoules made it possible to move the solvent zone through the feed rod without solvent losses. For crystal growth, a convex in the solvent zone vaulted growth interface is required. This is achieved by a suitable choice of growth parameters and by using graphite coated quartz ampoules. The main growth parameters are temperature, height of the Te-zone, and speed of the ampoule movement. At T=800 C, with a minimum zone height of 4 mm and a maximum speed of 10 mm/d, cylindrical single crystals of 30 mm length and a diameter of 10 mm are obtained. Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-11165 Bayerische Akademie der Wissenschaften, Munich (West Germany).

RADIATION PRESSURE MODELS FOR THE SATELLITE ORBITS THEORY [MODELLE DES STRAHLUNGSDRUCKS FUER DIE THEORIE DER SATELLITENBAHNEN]

Hermann Boehnhardt, Hanns Ruder, and Manfred Schneider Bayerischen Akademie der Wissenschaften 1981 73 p refs In GERMAN Sponsored by Deutschen Forschungsgemeinschaft (Ser-A-93; ISBN-3-7696-8175-4; ISSN-0065-5309) Copyright. Avail: Issuing Activity

Models were developed in order to precisely determine radiation pressure. With a view to geodetical use of precise laser rangefinding measurements, the study was limited to spherical satellites. For a full sphere, equations are set up for the radiation pressure force, for total absorption, and for reflection. For a satellite in the neighborhood of the Earth, the characteristics of the two radiation sources Sun and Earth are discussed and the two corresponding forces are calculated. For a spherical satellite, the radiation pressure of Sun, Earth albedo, mirroring reflection on the Earth surface, and the IR radiation pressure are calculated. Author (ESA)

N83-11166# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ARTIFICIAL SATELLITES ATTITUDE ADAPTIVE ESTIMATION

USING KALMAN FILTER WITH DYNAMIC MODEL COMPENSATION

Atair Rios Neto, Roberto Vieira daFonseca Lopes, and Ricardo Negreiros dePaiva Jun. 1982 7 p refs In PORTUGUESE; ENGLISH summary Presented at the 4th Brazilian Congr. on Automation, Sao Paulo, Brazil, 14-17 Sep. 1982
(INPE-2441-PRE/142) Avail: NTIS HC A02/MF A01

An optimal estimation algorithm is developed with the capability of real time applications under unfavorable conditions (acquisition phase, e.g.), when external torques are not completely known and have significant effect on attitude dynamics. To do so a procedure is used which combines extended Kalman filter with dynamical model compensation and adaptive state noise estimation techniques. The external torques (gravitational, magnetic, aerodynamic and solar radiation) are dynamically compensated in the estimator by a first order Gauss-Markov process and their global effect estimated together with the system state; simultaneously state noise is adaptively estimated to avoid divergence, by imposing statistical consistency residuals. The algorithm is tested with simulated data corresponding to a satellite with three axis motion and equipped with solar and Earth horizon sensors. Author

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N83-11167# ARO, Inc., Arnold Air Force Station, Tenn.
RANGE INSTRUMENTATION DEVELOPMENT Final Report, 1 Oct. 1979 - 30 Sep. 1980

P. H. Dugger AEDC Jul. 1982 37 p refs
(AD-A118436; AEDC-TR-81-25) Avail: NTIS HC A03/MF A01 CSCL 14/2

An experimental high speed pyrometry system employing an indium antimonide infrared detector demonstrated a capability for in flight nosetip surface temperature measurements at levels as low as 600 K. The use of narrow bandpass (30 A) optical filters in laser photography systems was found to improve photographic quality during applications where background luminosity was deleteriously intense. A time resolved spectrometer that covers the wavelength band from 3500 to 6800 A was designed to facilitate the spectral characterization of hypervolocity impact phenomena. A noninterfering model detection system that uses a continuous wave X-ray source and a scintillation detector was designed and fabricated. Evaluations showed that the system is impervious to high background luminosity levels and that it will provide reliable trigger pulses in range areas where such conditions exist. Author

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-11168# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STUDY OF VARIOUS ASPECTS OF PASSIVE GRAVITY-GRADIENT SATELLITE STABILIZATION M.S. Thesis [ESTUDO DE VARIOS ASPECTOS DA ESTABILIZACAO PASSIVA DE SATELITES POR GRADIENTE DE GRAVIDADE]

Joao Ricardo deFreitas Oliveira May 1982 91 p refs In PORTUGUESE; ENGLISH summary
(INPE-2400-TDL/088) Avail: NTIS HC A05/MF A01

The stabilization of a rigid satellite by gravity gradient was studied, with emphasis on the phases of attitude acquisition and steady state movement. The Hamiltonian formalism was used to get the equations of motion. The stability analysis was performed by two different techniques: the Liapunov's direct method and the linearization of the equations of motion for small angles. In order to accomplish the computer simulation, to obtain practical results, a specific geometry for the satellite was used. From these simulations, equipotential curves that provide the bonds of libration were obtained. A brief analysis of the damping process and of the perturbations working on the system was also made. Author

N83-11169*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA CATALOG SERIES FOR SPACE SCIENCE AND APPLICATIONS FLIGHT MISSIONS. VOLUME 1A: DESCRIPTIONS OF PLANETARY AND HELIOCENTRIC SPACECRAFT AND INVESTIGATIONS

Winifred Sawtell Cameron, ed. and Robert W. Vostreys, ed. Sep. 1982 114 p refs
(NASA-TM-84852; NSSDC/WDC-A-R/S-82-21-Vol-1A; NAS 1.15:84852) Avail: NTIS HC A06/MF A01 CSCL 22A

This volume is one of a series of eleven describing (1) the holdings of all spacecraft flight investigations for which NSSDC possesses data or can direct people to the data source; (2) all data sets held by NSSDC; (3) some of the data sets held and serviced by NASA-funded investigators; and (4) some of the data sets held and serviced by foreign investigators. For standard types of orbital information, i.e., predicted, refined, and definitive, the information is given in a tabular form. The standard description of a data set from an investigation is a free text since the wide variety of instruments precludes using a tabular format in most cases. A.R.H.

N83-11170*# National Aeronautics and Space Administration, Washington, D. C.
MISSION OPERATION REPORT. INTELSAT V-E (F-5) POST LAUNCH REPORT

26 Oct. 1982 2 p
(NASA-TM-84872; M-491-203-82-05; NAS 1.15:84872) Avail: NTIS HC A02/MF A01 CSCL 22A

The fifth of the INTELSAT 5 series was successfully placed into the desired transfer orbit by Atlas Centaur vehicle AC-60. The apogee kick motor was fired successfully, placing the satellite into near geosynchronous orbit. N.W.

N83-11171# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
DESCRIPTION OF P78-2 (SCATHA) SATELLITE AND EXPERIMENTS

Joseph F. Fennell 12 Jul. 1982 38 p refs
(Contract F04701-81-C-0082; Grant NSF ATM-80-19060)
(AD-A118232; TR-0082(2940-05)-10; SD-TR-82-43) Avail: NTIS HC A03/MF A01 CSCL 22/2

The P78-2 (SCATHA) satellite was placed into a near synchronous orbit in early February 1979. The satellite was a part of a joint U.S. Air Force/NASA program to study spacecraft charging. The satellite has its spin axis approximately parallel to the Earth's equatorial plane. This allows good pitch angle coverage by the particle experiments. The experiment complement consists of a complete set of plasma, energetic particle, composition, field and wave experiments. The satellite has already provided over two years of data; about one year (February, 1979 to March, 1980) of it has been provided to the experimenters as formatted digital tapes. The data is of very high quality and the coverage is good (> 90%). Author (GRA)

N83-11172# Army Materiel Development and Readiness Command, Alexandria, Va.
ROCKET AND MISSILE CONTAINER ENGINEERING GUIDE

Jan. 1982 298 p refs
(AD-A118284; DARCOM-P-706-298) Avail: NTIS HC A13/MF A01 CSCL 13/4

The degree of protection provided by a container is dependent

upon its components and their performance when functioning collectively. The challenge to the designer lies in the selection of the type and amount of materials, which when assembled according to scientific principles, will perform both effectively and efficiently within the pertinent operating environment. The contents of this chapter are oriented toward the provision of essential definitions, instructions, and reference data useful in establishing the basic design requirements for the working mechanical components of a container. Author (GRA)

N83-11173# Vought Corp. Advanced Technology Center, Inc., Dallas, Tex.
PROPULSION AUGMENTED CONTROL/LIFT SURFACE VALIDATION FOR MISSILE MANEUVER APPLICATION Final Report
R. L. Mask, J. G. Spangler, and C. H. Haight Apr. 1982 158 p refs
(Contract N60921-80-C-A053)
(AD-A118418; ATC-R-91100/2CR-21) Avail: NTIS HC A08/MF A01 CSCL 20/4

Improved maneuverability and controllability are prime goals in meeting a broad spectrum of tactical missile requirements. Configuration based on the Vought 'Propulsion Augmented Control/Lift Surface' (PACS) approach to aeropropulsive integration are candidates for satisfying these requirements. The PACS concept utilizes a jet issuing from a trailing edge nozzle to induce augmented control loadings over fin or wing planforms. The current work provides experimental validation of PACS feasibility for a representative missile fin geometry at typical supersonic/transonic conditions. Author (GRA)

N83-11174# Naval Intelligence Support Center, Washington, D. C. Translation Div.
TDF-1, THE FRENCH BROADCASTING SATELLITE
C. Derieux 22 Apr. 1982 11 p Transl. into ENGLISH from L'Aeron. et L'Astron. (France), no. 91, 1981 p 31-37
(AD-A117961; NISC-TRANS-6798) Avail: NTIS HC A02/MF A01 CSCL 17/2

The role of the TDF-1 satellite is discussed. A general description is then given of this French satellite that is scheduled for launch late in 1984. L.F.M.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-11175*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SATELLITE SERVICES WORKSHOP, VOLUME 1 Final Report
1982 453 p refs Workshop held in Houston, Tex., 22-24 Jun. 1982 2 Vol.
(NASA-TM-84873; JSC-18201-Vol-1; NAS 1.15:84873) Avail: NTIS HC A20/MF A01 CSCL 22A

Key issues associated with the orbital servicing of satellites are examined including servicing spacecraft and equipment, servicing operations, economics, satellite design, docking and berthing, and fluid management. For individual titles, see N83-11176 through N83-11197.

N83-11176*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SATELLITE SERVICES SYSTEM OVERVIEW
Gordon Rysavy *In its* Satellite Serv. Workshop, Vol. 1 1982 p 1-9 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The benefits of a satellite services system and the basic needs of the Space Transportation System to have improved satellite service capability are identified. Specific required servicing equipment are discussed in terms of their technology development status and their operative functions. Concepts include maneuverable television systems, extravehicular maneuvering unit, orbiter exterior lighting, satellite holding and positioning aid, fluid transfer equipment, end effectors for the remote manipulator system, teleoperator maneuvering system, and hand and power tools.M.G.

N83-11177*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ROLE OF SRMS IN SATELLITE SERVICING
R. B. Fuller *In its* Satellite Serv. Workshop, Vol. 1 1982 p 10-31 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The standard configuration of the shuttle remote manipulator system (RMS) is reviewed and the role of the RMS in satellite servicing is discussed. The RMS tasks include payload deployment, retrieval/berthing, large spacecraft assembly/module exchange, assist astronaut extravehicular servicing, and remote servicing. The potential growth of the RMS to increase its utilization and improve its performance is also addressed. The projected concepts include dual arm operation, a remote mounted RMS, and special purpose end effectors. In particular, a universal service tool system with both remote and manual modes of operation is described. M.G.

N83-11178*# Martin Marietta Corp., Bethesda, Md.
MANNED MANEUVERING UNIT
Fran Bergonz *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 32-43 Original document was announced as N82-74783 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The design of the manned maneuvering unit and associated flight support station is described. Thrust and maneuver capabilities per propellant supply are calculated and special consideration is given to the requirements for rotational maneuvers with large cargos. Satellite attachment devices and a remote controlled small payload maneuvering system are also discussed. M.G.

N83-11179*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE EXTRAVEHICULAR MOBILITY UNIT (EMU): PROVEN HARDWARE FOR SATELLITE SERVICING
In its Satellite Serv. Workshop, Vol. 1 1982 p 44-72 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

A general technical description of the extravehicular mobility unit (EMU) is given. The description provides a basis for understanding EMU mobility capabilities and the environments a payload is exposed to in the vicinity of an EMU. Author

N83-11180*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TELEOPERATOR MANEUVERING SYSTEM
James R. Turner *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 73-100 Original document was announced as N82-74560 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The teleoperator maneuvering system (TMS), consisting of the vehicle, the shuttle orbiter bay cradle with airborne support equipment, and the aft flight deck control station, is described. The vehicle is a reusable remotely controlled free flying vehicle capable of a variety of missions including payload placement, retrieval, servicing, viewing, and large space systems assembly support. The TMS flies preprogrammed trajectories as well as being controlled or reprogrammed from the aft flight deck or the ground. A building block design philosophy is described which permits the evolution of capability as it is needed and delays cost as much as possible. Various mission operations are discussed. M.G.

N83-11181*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DEVELOPMENT OF AUTOMATED RENDEZVOUS AND PROXIM-

ITY OPERATIONS TECHNIQUES FOR RENDEZVOUS AND CLOSE-IN OPERATIONS AND SATELLITE SERVICING
Robert W. Becker and Robert L. Anderson *In its* Satellite Serv. Workshop, Vol. 1 1982 p 110-136 Prepared in cooperation with LinCom Corp., Houston, Tex. (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The development of freeflyer maneuvering system and shuttle orbiter flight profiles and hardware/software requirements that will provide and automated rendezvous, station keeping, and docking capability is discussed. Automated control techniques, sensors, target vehicle requirements, and a soft docking system are addressed. M.G.

N83-11182*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOLAR MAXIMUM OBSERVATORY REPAIR MISSION
G. P. Kenney *In its* Satellite Serv. Workshop, Vol. 1 1982 p 137-165 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

A description of the Solar Maximum Observatory and the operational status of its instrument systems is presented. The major science objectives which could be made possible with repairs to the spacecraft are defined. Hardware requirements and procedures for a repair mission are detailed. In general the mission involves: (1) the capture and control of the observatory in free flight by an astronaut in the manned manipulator unit; (2) berthing the observatory to the orbiter with the remote manipulator system; and (3) repairing the scientific instruments and replacing the attitude control system through extravehicular activity. M.G.

N83-11183*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CO-ORBITING MECHANICS
L. E. Livingston *In its* Satellite Serv. Workshop, Vol. 1 1982 p 166-181 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The motions of co-orbiting satellites is examined with reference to a free flying satellite requiring periodic servicing and an orbiting service base. The problems of differential orbit decay and nodal regression are emphasized. M.G.

N83-11184*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PAYLOAD PROCESSING AND INTEGRATION AT KSC
D. C. Moja *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 182-196 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The shuttle payload processing facilities at the Kennedy Space Center and the payload processing and integrating procedures are briefly outlined. M.G.

N83-11185*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ADVANCED EXTRAVEHICULAR MOBILITY UNIT STUDY
W. Elkins *In its* Satellite Serv. Workshop, Vol. 1 1982 p 197-214 Prepared in cooperation with Lockheed Missiles and Space Co., Burbank, Calif. (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Components of the advanced extravehicular mobility unit (suit) are described. Design considerations for radiation protection, extravehicular operational pressure, mobility effects, tool/glove/effector, anthropometric definition, lighting, and equipment turnaround are addressed. M.G.

N83-11186*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
PAYLOAD IVA TRAINING AND SIMULATION
James H. Monsees *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 215-228 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The development of a training program for the intravehicular operation of space shuttle payloads is discussed. The priorities for the program are compliance with established training standards, and accommodating changes. Simulation devices are also reviewed. M.G.

N83-11187*# Lockheed Missile and Space Co., Burbank, Calif.
SPACECRAFT REDUNDANCY AND ENVIRONMENTAL TESTS. AN HISTORIC EVALUATION
V. S. Bollman and R. A. Blockinger *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 229-246 ref (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The necessity of providing highly redundant spacecraft in the shuttle era was evaluated. Environmental and acceptance tests were done. Histories of 67 spacecraft over a 12 year period were analyzed. The final result of this study is that LMSC (Lockheed Missiles and Space Co., Inc.) is convinced of the significant value of redundancy in spacecraft and systems environmental testing and such techniques should be carried forward into the shuttle era. B.W.

N83-11188*# Lockheed Missile and Space Co., Burbank, Calif. Advanced Systems Dept.
ANALYSIS OF SATELLITE SERVICING COST BENEFITS
Herbert O. Builteman *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 247-260 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Under the auspices of NASA/JSC a methodology was developed to estimate the value of satellite servicing to the user community. Time and funding precluded the development of an exhaustive computer model; instead, the concept of Design Reference Missions was involved. In this approach, three space programs were analyzed for various levels of servicing. The programs selected fall into broad categories which include 80 to 90% of the missions planned between now and the end of the century. Of necessity, the extrapolation of the three program analyses to the user community as a whole depends on an average mission model and equivalency projections. The value of the estimated cost benefits based on this approach depends largely on how well the equivalency assumptions and the mission model match the real world. A careful definition of all assumptions permits the analysis to be extended to conditions beyond the scope of this study. Author

N83-11189*# TRW, Inc., Redondo Beach, Calif. Field Operations Div. and Technology Group.
DESIGN OF THE MATERIALS EXPERIMENT CARRIER FOR ON-ORBIT SERVICING
Donald M. Waltz and Hans F. Meissinger *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 261-289 ref (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

This paper discussed the MEC system and its mission from the viewpoint of orbit servicing. Information is provided on MEC system requirements, design for on orbit servicing, on orbit servicing operations and rationale and servicing costs. Author

N83-11190*# Lockheed Missile and Space Co., Burbank, Calif. Space Systems Div.
DESIGN CONSIDERATIONS FOR ON-ORBIT SERVICING
H. T. Fisher *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 290-306 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

An overview of the general design of space vehicles serviced in orbit is presented. The basic space vehicle systems, subsystems, modules components, and associated appendages comprise the elements to be considered. Primary emphasis is given to the multi-disciplinary considerations in the development of requirements, and in particular, design of the space vehicle to facilitate orbital sevice by the extra-vehicular crew person(s). B.W.

N83-11191*# McDonnell-Douglas Corp., St. Louis, Mo.
ELECTROPHORESIS OPERATIONS IN SPACE
David W. Richman *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 307-319 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Application of electrophoresis in space processing is described. Spaceborne experiments in areas such as biological products and FDA approved drugs are discussed. These experiments will be carried on shuttle payloads. B.W.

N83-11192*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. Space Platform Project.
SPACE PLATFORM
Gene Beam *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 320-334 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

The space platform subsystem design characteristics are described in detail. Compatibility with the STS/orbiter is an important factor. B.W.

N83-11193*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PAYLOAD INSTALLATION AND DEPLOYMENT AID FOR SPACE SHUTTLE ORBITER SPACECRAFT REMOTE MANIPULATOR SYSTEM
Thomas O. Ross *In its* Satellite Serv. Workshop, Vol. 1 1982 p 335-349 Original document was announced as N79-22558 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

An aid concept known as the PIDA (Payload Installation and Deployment Aid) is presented as a way to assist the Remote Manipulator System (RMS) by relaxing the accuracy required during payload handling in the payload bay. The aid concept was designed and developed to move payloads through a prescribed path between the confined quarters of the payload bay and a position outside the critical maneuvering area of the Orbiter. An androgynous docking mechanism is used at the payload/PIDA interfaces for normal docking functions that also serves as the structural connection between the payload and the Orbiter, that is capable of being loosened to prevent transfer of loads between a stowed payload and the PIDA structure. A gearmotor driven drum/cable system is used in the docking mechanism in a unique manner to center the attenuator assembly, align the ring and guide assembly (docking interface) in roll, pitch, and yaw, and rigidize the mechanism at a nominal position. A description of the design requirements and the modes of operation of the various functions of the deployment and the docking mechanisms are covered.
Author

N83-11194*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BERTHING/DOCKING
Harry Erwin *In its* Satellite Serv. Workshop, Vol. 1 1982 p 350-380 refs (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Three studies were completed establishing sensor performance, technology status, and conceptual design requirements for rendezvous stationkeeping, and docking. A consideration of design constraints and the availale technology has led to the conclusion that the sensor should be a CW optical radar employing a semiconductor-laser transmitter and an image-dissector receiver. The performance obtainable for a representative sensor was compared to specifications generated during the study and it was found that this type of sensor can meet the needs of future Earth-orbital operations. B.W.

N83-11195*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLUIDS MANAGEMENT TECHNOLOGY
John M. McGee *In its* Satellite Serv. Workshop, Vol. 1 1982 p 381-405 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Various techniques and methods in fluid management are discussed. Propellant on-orbit transfer efficiency from the space shuttle orbiter to orbital transfer vehicle is discussed. Techniques such as refueling, residuals recovery and propellant storage are described. B.W.

N83-11196*# Rockwell International Corp., Pittsburgh, Pa. Space Systems Group.
ORBITER OMS AND RCS TECHNOLOGY
R. A. Boudreaux *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 406-430 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Orbiter Orbital Maneuver Subsystem (OMS) and Reaction Control Subsystem (RCS) tankage has proved to be highly successful in shuttle flights on-orbit propellant transfer tests were done. Tank qualification tests along with flight demonstrations were carried out future uses of storable propellants are cited. B.W.

N83-11197*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CRYOGENIC FLUID TRANSFER - ORBITAL TRANSFER VEHICLE
Leon J. Hastings *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 1 1982 p 431-448 (For primary document see N83-11175 02-16)
Avail: NTIS HC A20/MF A01 CSCL 22A

Fluid transfer requirements are presented for the orbital transfer vehicle (OTV) issues such as OTV configuration, hardware design and size are taken into consideration. Tank chilldown, tank fill and thermodynamic properties are all evaluated in relationship to fluid transfer needs. B.W.

N83-11198*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SATELLITE SERVICES WORKSHOP, VOLUME 2 Final Report
1982 231 p refs Workshop held in Houston, Tex., 22-24 Jun. 1982 2 Vol.
(NASA-TM-84874; JSC-18201-Vol-2; NAS 1.15:84874) Avail: NTIS HC A11/MF A01 CSCL 22A

Methods for on-orbit servicing of satellites are discussed. For individual titles, see N83-11199 through N83-11209.

N83-11199*# Grumman Aerospace Corp., Bethpage, N.Y.
ADVANCED SERVICE EQUIPMENT
John Mockovciak, Jr. *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 p 1-28 ref (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Orbiter-based service equipment needs/usage are identified by considering a broad spectrum of on-orbit operational scenarios associated with three primary mission events: initial launch, revisits, and Earth return. Nominal and alternate modes of operation, contingency situations (as remote manipulator system inoperative), and Orbiter close proximity operations are included. Satellite classes considered are direct delivery and servicing of the orbiter, low Earth orbiter/propulsion, sorties and DOD, geosatellites, and planetary and other satellites. J.D.

N83-11200*# Grumman Aerospace Corp., Bethpage, N.Y.
SATELLITE RETRIEVAL AND SERVICING OPERATIONS WITH PROXIMITY OPERATIONS MODULES
Rudolph J. Adornato *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 21 p (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

The concept of manned and unmanned proximity modules (POM) to assist the Orbiter in retrieval, servicing, and emergency operations of orbiting payloads is discussed. An unmanned POM, capable of examining or capturing and returning to the Orbiter large satellites which are station-keeping at distances up to one

kilometer from the Orbiter, is presented and its design features defined. Also presented is the concept of a manned POM which is capable of capturing and maneuvering smaller payloads in or about the Orbiter payload bay. The manned POM also serves as a free flying work station used to support satellite servicing and provide a back-up to Orbiter situations when the remote manipulator is inoperative. Author

N83-11201*# Lockheed Missile and Space Co., Burbank, Calif.
SPACECRAFT AUTOMATIC UMBILICAL SYSTEM
G. C. Rudy *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 39 p Original document was announced as N81-22414 (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

A conceptual definition of an appropriate berthing technique and a prototype design of an automatic umbilical system suitable for use with payloads carried by the Space Shuttle are presented. A four-element berthing system is described. This concept consists of a set of four remote manipulator system (RMS)-type end-effector capture/tie-down devices on the power system and corresponding RMS-type grapple fittings on the payload. In operation, the RMS maneuvers the payload to a position where the four grapple fittings can be snared within the end-effectors and then secured to the power system. The concept takes advantage of mechanisms and operating techniques developed for attaching the RMS to a payload. Although the umbilical installation is attached to the docking interface structure, its operation is independent and it must comply with a set of primary requirements specified by Marshall Space Flight Center (MSFC), which is presented. J.D.

N83-11202*# Grumman Aerospace Corp., Bethpage, N.Y.
SPACE OPERATIONS CENTER APPLICATIONS OF SATELLITE SERVICE EQUIPMENT
Ronald W. McCaffrey *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 14 p refs (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Satellite servicing requirements for a continuously manned Space Operations Center (SOC) are discussed. Applications for Orbiter developed service equipment are described, together with representative satellite servicing operations for use on SOC. These services cover the full mission cycle from orbital deployment to on-orbit maintenance/repair and, eventually, removal from orbit. An orbiting base, such as the SOC, can provide many of the same services at less cost than the Space Shuttle transportation system. J.D.

N83-11203*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REMOTE ORBITAL SERVICING SYSTEM CONCEPT
Alfred J. Meintel and Roger T. Schappell (Martin-Marietta Aerospace Corp.) *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 p 104-119 (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Increased applications of automation technology identified as necessary for NASA to carry out its missions within the constraints of future funding and available physical resources are described. A concept for a Remote Orbital Servicing System (ROSS) based on present teleoperator and robotics technology is presented. A single servicer design compatible with three specified spacecraft, capable of performing service to the same extent as manned extravehicular activity, controlled from a ground control station, and using currently available technology is conceptualized. J.D.

N83-11204*# Grumman Aerospace Corp., Bethpage, N.Y.
OPEN CHERRY PICKER SIMULATION RESULTS
C. A. Nathan *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 17 p (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

The simulation program associated with a key piece of support equipment to be used to service satellites directly from the Shuttle is assessed. The Open Cherry Picker (OCP) is a manned platform mounted at the end of the remote manipulator system (RMS) and is used to enhance extra vehicular activities (EVA). The results of simulations performed on the Grumman Large Amplitude Space Simulator (LASS) and at the JSC Water Immersion Facility are summarized. E.A.K.

N83-11205*# Grumman Aerospace Corp., Bethpage, N.Y.
SERVICING COSTS FOR REPRESENTATIVE SERVICE MISSIONS
John Mockovciak, Jr. *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 11 p ref (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

User cost for three satellite services were assessed. The three missions are: advanced X-ray astrophysics facility (AXAF) revisit; upper atmosphere research satellite (UARS) revisit: and solar maximum mission (SMM) Earth return. Service scenarios for the missions to identify service equipment needs and on orbit usage were developed. The AXAF revisit is a service mission involving a contamination sensitive satellite. Following servicing and checkout, the spacecraft is redeployed from the orbiter. The total user charges for revisit missions is from 5 to 10% less than the cost to build and relaunch a replacement satellite. It is indicated that satellite servicing from the Orbiter is cost effective. E.A.K.

N83-11206*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOW-EARTH ORBIT SATELLITE SERVICING ECONOMICS
R. F. Davis and F. J. Cepollina *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 p 150-167 (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Servicing economics of low Earth orbit satellites were studied. The following topics are examined: the economic importance of the repair missions; comparison of mission cost as opposed to satellite modulation transfer functions over a 10 year period; the effect of satellite flight rate change due to changes in satellite failure rate; estimated satellite cost reduction with shuttle operation projects from the 1960's to the 1970's; design objectives of the multimission modular spacecraft; and the economic importance of the repair mission. E.A.K.

N83-11207*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DESIGN OBJECTIVES OF THE MULTIMISSION MODULAR SPACECRAFT
R. E. Davis *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 p 168-199 (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Servicing economics for LANDSAT are examined. The following objectives of the multimission modular spacecraft are outlined: retrieval; multimission capability; standard flight support system; standard hardware; repair and refurbishment on orbit; instrument replacement; standard ground support system; and standard software. E.A.K.

N83-11208*# Grumman Aerospace Corp., Bethpage, N.Y.
CHARACTERISTICS OF THE HANDLING AND POSITIONING AID
C. J. Goodwin *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 15 p (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

The handling and positioning aid which (HPA) provides a wide range of adjustable work stations both inboard and outboard of the cargo bay is discussed. It can assist with berthing and docking, it is robust, stiff, has a simple control system, and is modular. An articulated arm version of HPA employed in a typical servicing mission is shown. Mounted on a base frame that spans the Orbiter cargo bay, the 6 m arm is long enough to hold the satellite being serviced and keep its solar array clear of the Orbiter radiators. By

adjusting the length and angle of the support platform mast, and rotating the tip of the HPA arm, almost every item on the satellite can be reached. Spares and change-out units can be brought to and from the work site by the RMS, which is controlled from the aft flight deck. The fore and aft position of the base frame can be changed between Orbiter flights and this, together with the 5 degrees of freedom (DOF) of the long arm, allows work sites to be chosen that meet the clearance, reach and vision requirements of many missions. Flight article activities are shown are shown above the dashed horizontal line and Development Test Article (DTA) work below. Flight article requirements and concepts and the design of the DTA are developed. E.A.K.

N83-11209*# Rockwell International Corp., Pittsburgh, Pa.
THE SPACE SHUTTLE ORBITER PAYLOAD RETENTION SYSTEMS
J. H. Hardee *In* NASA. Johnson Space Center Satellite Serv. Workshop, Vol. 2 1982 p 216-227 (For primary document see N83-11198 02-16)
Avail: NTIS HC A11/MF A01 CSCL 22A

Payloads are secured in the orbiter payload bay by the payload retention system or are equipped with their own unique retention systems. The orbiter payload retention mechanisms provide structural attachments for each payload by using four or five attachment points to secure the payload within the orbiter payload bay during all phases of the orbiter mission. The payload retention system (PRS) is an electromechanical system that provides standarized payload carrier attachment fittings to accomodate up to five payloads for each orbiter flight. The mechanisms are able to function under either l-g or zero-g conditions. Payload berthing or deberthing on orbit is accomplished by utilizing the remote manipulator system (RMS). The retention mechanisms provide the capability for either vertical or horizontal payload installation or removal. The payload support points are selected to minimize point torsional, bending, and radial loads imparted to the payloads. In addition to the remotely controlled latching system, the passive system used for nondeployable payloads performs the same function as the RMS except it provides fixed attachments to the orbiter. E.A.K.

N83-11162# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE TUGS
Lin Yiping *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 13-19 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)
Avail: NTIS HC A02/MF A01 CSCL 22/2

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N83-11210*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONCEPT FOR ADVANCED SATELLITE COMMUNICATIONS AND REQUIRED TECHNOLOGIES
James R. Ramler and Jack A. Salzman 1982 12 p refs Presented at 1982 Natl. Telesystems Conf., Galveston, Tex., 7-10 Nov. 1982; sponsored by IEEE
(NASA-TM-82984; E-1415; NAS 1.15:82984) Avail: NTIS HC A02/MF A01 CSCL 17B

The advanced communications technology satellite (ACTS) program of NASA is aimed at the development of high risk technologies that will enable exploiting higher frequency bands and techniques for improving frequency reuse. The technologies under development include multiple beam spacecraft antennas, on-board switching and processing, RF devices and components and advanced Earth stations. The program focus is on the Ka-band (30/20 GHz) as the implementing frequency since it has five times the bandwidth of either the C- or Ku-bands. However, the technology being developed is applicable to other frequency bands as well and will support a wide range of future communications systems required by NASA, other Government agencies and the commercial sector. An overview is presented of an operational 30/20 GHz satellite system that may evolve. How the system addresses service requirements is discussed, and the technology required and being developed is considered. A.R.H.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-11211# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GUIDANCE AND CONTROL OF SPACE VEHICLES FOR SATELLITE LAUNCHING
Atair Rios Neto Jun. 1982 17 p refs In PORTUGUESE; ENGLISH summary Presented at the 3rd Natl. Math. Meeting, Sao Paulo, Brazil, 6-14 Jul. 1982
(INPE-2426-PRE/132) Avail: NTIS HC A02/MF A01

The problem of trajectory optimization and control of multistage satellite launchers is discussed. From a proposed strategy for the launching, an optimization problem is formulated which is considered sufficiently realistic for the phase of mission analysis and definition. Following that, a solution scheme is proposed for the open loop and the closed loop problems, using procedures of suboptimal control and of stochastic control, respectively. Author

N83-11212# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatiale.
STUDY CHARACTERIZING THE LIMITS OF TECHNOLOGIES USED IN ONBOARD CONTROL EQUIPMENT [ETUDE DE LA CARACTERISATION AUX LIMITES DES TECHNOLOGIES UTILISEES DANS LES EQUIPMENTS DE SERVITUDE EMBARQUES]
J. M. Garrigue Oct. 1981 169 p refs In FRENCH Report will also be announced as translation (ESA-TT-764)
(CNES-81/QPE/FT/402) Avail: NTIS HC A08/MF A01

Application of electronics technology in the design and development of space systems is assessed. Finding the functional limits of monolithic microelectronic subassemblies is emphasized, given component manufacturing, equipment fabrication, and space environment operational constraints. Measurable performance parameters are identified for electronic components and interconnections, plastic materials, and for tin-lead soldered joints. Thermal vacuum, mechanical, irradiation, and electromagnetic compatibility experiments were carried out. Results confirm equipment functional design limits, found through aerospace research and analysis.
Author (ESA)

N83-11160# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACECRAFT STRUCTURAL SYSTEMS
Wu Jiansheng *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 1-7 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)
Avail: NTIS HC A02/MF A01 CSCL 22/2

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-11213*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ION ACCELERATOR SYSTEMS FOR HIGH POWER 30 CM THRUSTER OPERATION Final Report
Graeme Aston 15 Nov. 1982 45 p refs
(Contracts NAS7-100; NAS7-918)
(NASA-CR-168001; NAS 1.26:168001) Avail: NTIS HC A03/MF A01 CSCL 21C

Two and three-grid accelerator systems for high power ion thruster operation were investigated. Two-grid translation tests show that over compensation of the 30 cm thruster SHAG grid set spacing the 30 cm thruster radial plasma density variation and by incorporating grid compensation only sufficient to maintain grid hole axial alignment, it is shown that beam current gains as large as 50% can be realized. Three-grid translation tests performed with a simulated 30 cm thruster discharge chamber show that substantial beamlet steering can be reliably affected by decelerator grid translation only, at net-to-total voltage ratios as low as 0.05. Author

N83-11214# ARO, Inc., Arnold Air Force Station, Tenn.
OPERATING CHARACTERISTICS OF AN ABLATIVE PULSED PLASMA ENGINE Final Report, 1 Jan. - 30 Sep. 1981
R. Dawbarn, R. L. McGuire, S. L. Steely, and J. G. Pipes AEDC Jul. 1982 90 p refs
(AD-A118260; AEDC-TR-82-9; AFRPL-TR-82-17) Avail: NTIS HC A05/MF A01 CSCL 21/3

The Teflon pulsed thruster is being considered as an attitude control and station-keeping device for spacecraft and satellites. In determining the compatability of the pulsed plasma thruster with spacecraft systems, it is necessary to assess the potentially harmful effects which the exhaust products may have on various spacecraft surfaces. Author (GRA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N83-11215# Army Materials and Mechanics Research Center, Watertown, Mass.
PROCEEDINGS OF THE CRITICAL REVIEW: TECHNIQUES FOR THE CHARACTERIZATION OF COMPOSITE MATERIALS Final Report
May 1982 479 p refs Review held in Cambridge, Mass., 8-10 Jun. 1981; sponsored by ONR
(AD-A116733; AMMRC-MS-82-3) Avail: NTIS HC A21/MF A01 CSCL 11/4

Techniques for predicting the performance of composite materials, process control for monitoring the quality of composite materials, and methods for characterizing composite materials were discussed. For individual titles, see N83-11216 through N83-11245.

N83-11216# Army Materials and Mechanics Research Center, Watertown, Mass. Polymer Research Div.
APPLICATION OF NEW TECHNIQUES FOR CURE MONITORING OF EPOXIES c27
Gary L. Hagnauer *In its* Proc. of the Critical Rev. May 1982 p 3-24 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Techniques for monitoring the cure of epoxy resins involving the measurement of changes in thermal, rheological, electrical, or mechanical properties as a function of cure time and temperature are evaluated. Extents of cure determined by different techniques are seldom in good agreement, and for most techniques there is a problem of defining the state of full or ultimate cure. In considering the application of new monitoring techniques, it is desirable to understand how the measured parameters correlate with intrinsic chemical and structural changes in the epoxy resin matrix and at the fiber resin matrix interface as the resin reacts and crosslinking develops. Advanced chromatographic and spectroscopic techniques were applied to analyze chemical changes taking place during the initial stages of cure and to elucidate the structure of the resin matrix at the onset of gelation. The chemical and structural changes are compared with differential scanning calorimetry, torsional braid analysis, and dc resistance cure monitoring techniques. J.D.

N83-11217# Army Materials and Mechanics Research Center, Watertown, Mass. Composites Development Div.
ACOUSTIC EMISSION DURING CURE OF FIBER REINFORCED COMPOSITES c24
Y. L. Hinton, R. J. Shufored, and W. W. Houghton *In its* Proc. of the Critical Rev. May 1982 p 25-36 ref (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Acoustic emission shows promise as an in process quality control technique for monitoring the cure of fiber reinforced laminates. Acoustic emission (AE) data (including events, counts, count rate, rms, and amplitude distribution) and dc resistance data were collected during the cure (heating) and cool down of 6 ply SP250/S glass and Fiberite 934/Kevlar 49 prepreg laminates. Acoustic emission appears to be very sensitive to microstructural changes in laminate occurring during the cure. The AE observed during the heating phase is thought to be due to outgassing of the resin and cure shrinkage (caused by polymerization/crosslinking), whereas the AE during cool down is due to residual stresses created in the laminate because of the mismatch in coefficients of thermal expansion between the fiber and the resin. Under identical experimental conditions, Kevlar/epoxy laminates produced significantly more counts with higher amplitudes than the glass/epoxy laminates. Correlations were found between the acoustic emission activity, the dc resistance and the resultant residual stresses. Author

N83-11218# Sandia Labs., Albuquerque, N. Mex.
AN INTERFEROMETRIC STUDY OF EPOXY RESIN GELATION c27
K. R. Hirschbuehler *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 37-58 refs Document also announced as N82-16252 (For primary document see N83-11215 02-23)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The transition of epoxy resins from a mobile liquid to a rubbery gel was investigated. The locus of initial gelation in an epoxy resin, and the course of gelation through both neat resins and glass fiber/epoxy resin composites were determined by monitoring the local changes in refractive index in transparent epoxy castings using laser interferometry, supplemented by temperature profiles obtained from thermocouple arrays. These experiments were carried out on pure DGERA epoxy (DOW DER-332) cured with a

variety of primary amine, secondary amine, and anhydride curing agents. The gelation behavior of DGERA epoxy was found to depend on the active groups of the curing agent. For primary amines the time required for the gel front to nucleate was highly variable. However, the time required for the gel front to pass through the sample was far less variable. Each of the curing agents evaluated showed one or more pregelation transitions. Comparison with the temperature profiles shows that the heat transfer mechanism deviates considerably from pure conduction theory and that convection must be considered. Introduction of glass fibers into the resin affected both the nucleation site for gelation and the gelation path. J.D.

N83-11219# Westinghouse Research and Development Center, Pittsburgh, Pa.
MONITORING CURE OF LARGE AUTOCLAVE MOLDED PARTS BY DIELECTRIC ANALYSIS **c24**
J. Chottiner, Z. N. Sanjana, M. R. Kodani, K. W. Lengel, and G. B. Rosenblatt *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 59-70 refs Prepared in cooperation with Westinghouse Electric Corp., Sunnyvale, Calif. (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The feasibility of using dielectric analysis as a means of monitoring and controlling cure of large closures during autoclave molding was investigated. In dielectric analysis the dissipation factor and capacitance of the sample is continuously monitored as a function of time and frequency. Dissipation factor profiles were established for the suppliers' recommended cure cycle and for modified cure cycles. Good reproducibility was obtained on subsequent scaling up to production size (7 ft x 20 ft) autoclaves. Good correlation was also observed during production runs of full scale closures. The effects of cure variables on the dissipation factor profiles and on the mechanical properties of the prepared laminates were analyzed for extent of correlation. It was determined that dielectric analysis can be used to monitor autoclave cure of composites, and within limits, process control may be feasible.
Author

N83-11220# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
MICRODIELECTROMETRY **c27**
Stephen D. Senturia, Norman F. Sheppard, Steven L. Garverick, Huan L. Lee, and David R. Day *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 71-86 refs (For primary document see N83-11215 02-23)
(Grants NSF DMR-78-24815; NSF ENG-77-17219)
Avail: NTIS HC A21/MF A01 CSCL 11/3

The low frequency dielectric properties of resins provide a useful tool for characterization both of the curing process and of fully cured material. Integrated circuit technology was used to develop a miniaturized dielectric probe that combines small size with built in amplification to achieve sensitivity at frequencies as low as 1 Hz. The device combines a planar interdigitated electrode structure with a pair of matched field effect transistors. The microdielectrometer chip can be implanted in a specimen, or a small sample of material (a few milligrams) can be placed on the active area of the device. When combined with an off chip electronic feedback system, the device can be used to measure the complex dielectric constant of the sample material either as it cures, or after cure. The device is capable of operating at temperatures up to 200 C, making it useful for a wide variety of curing and post cure studies. Device calibration is based on a two dimensional computer model which was experimentally confirmed for a variety of control samples. Several typical applications are illustrated by experiments, and the use of data to follow changes in the dominant low frequency dielectric relaxation during the cure of a model epoxy resin system are presented.
Author

N83-11221# Army Materials and Mechanics Research Center, Watertown, Mass. Composites Development Div.
EFFECTS OF MOISTURE ON THE MECHANICAL PROPERTIES OF GLASS/EPOXY COMPOSITES **c24**
C. D. Douglas and E. R. Pattie *In its* Proc. of the Critical Rev. May 1982 p 89-96 refs Document also announced as A82-29036 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Two glass/epoxy systems differing only in coupling agents were analyzed. The effects of moisture on the mechanical properties were found as a function of immersion time. The specimens were all six ply unidirectional laminates cut as five different fiber angles. Temperatures of the immersion baths range from 25 C to 80 C. It was found that there was up to a 60 percent decrease in ultimate strengths after three months of immersion in the 80 C bath. Stiffnesses were found to decrease also but to a lesser extent than that of ultimate strengths. Changes in specimen weight were monitored and observed to increase as much as 3.5 percent by weight. After extended immersion time at elevated temperatures, specimen weights began to drop, possibly as a result of some leaching phenomena. It was also noticed that moisture content did vary as a function of fiber angle for one of the composite systems.
Author

N83-11222# Bristol Univ. (England). Physics Lab.
ACCOMMODATION AND RELAXATION OF STRAIN DURING MOISTURE SORPTION **c24**
K. H. G. Ashbee, J. P. Sargent, and Elizabeth Walter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 97-104 Sponsored in part by Science Research Council, England (For primary document see N83-11215 02-23)
(Grant DA-ERO-78-G-117)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Accommodation and relaxation of strain in an epoxy resin matrix surrounding glass and carbon fibers were investigated. The radial and tangential components of the stress field present around an individual glass fiber were measured after cooling from the resin cure temperature. Swelling anisotropy during water uptake and stresses introduced into both matrix and fiber during cooling to room temperature were measured. The incidence of loss of load transfer during uptake of hot water was measured for epoxy composites reinforced with carbon fiber, and it was determined that the presence of a 4% sodium ion concentration on the surface of the fiber accelerated the deterioration of linkages between matrix and fiber. J.D.

N83-11223# McDonnell-Douglas Research Labs., St. Louis, Mo.
SPATIAL DISTRIBUTION OF VOLATILE COMPOUNDS IN EPOXY RESINS FOR COMPOSITES **c24**
M. A. Grayson and C. J. Wolf *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 107-117 (For primary document see N83-11215 02-23)
(Contract DAAG46-80-M-1371)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Precision abrasion mass spectrometry (PAMS) was used to determine the quantitative distribution profile of water in three epoxy resin systems: tetraglycidyl diaminodiphenyl methane (TGDDM) cured with dicyandiamide (DICY), diglycidyl ether of bisphenol A (DGEBA) cured with DICY, and TGDDM cured with diaminodiphenyl sulfone (DDS). The first two resin systems also contain an epoxy cresol novolac. Specimens of the three resins were exposed to a humid environment for 4 to 2000 hours. The water distribution was determined immediately following environmental exposure. Distribution profiles of oxygen, carbon dioxide, and dichloromethane were also measured in the specimens. A brief description of the PAMS apparatus and a discussion of the distribution profiles of the sorbed gases in the three epoxy resin systems as a function of exposure time are given.
Author

N83-11224# Naval Surface Weapons Center, White Oak, Md.
MECHANISTIC AND PHENOMENOLOGICAL THEORIES FOR PREDICTING COMPOSITE BEHAVIOR AND ENVIRONMENTAL EFFECTS **c24**
Joseph M. Augl *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 119-156 refs (For primary document see N83-11215 02-23)

Avail: NTIS HC A21/MF A01 CSCL 11/4

Prediction of the properties of composite laminates and of environmental changes due to temperature and moisture based on observed variations in unidirectional ply properties is considered. Accurate prediction of ply properties such as elastic, viscoelastic, and elastic-plastic behavior is possible if the changes in matrix and fiber properties are known for the respective environments. Laminate properties are predicted from known matrix-fiber prepare and test composites in which the matrix properties dominate the composite properties. Discrepanices between theory and experiment were investigated when observed. Macromechanical, semimicromechanical, and micromechanical analyses of stress and strain are discussed. J.D.

N83-11225# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.

THE INFLUENCE OF MOISTURE ON THE TRANSVERSE MECHANICAL BEHAVIOR OF KEVLAR 49/EPOXY COMPOSITES AT 25 DEG C **c24**

Ronald E. Allred and David K. Roylance *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 157-170 refs Sponsored by DOE (For primary document see N83-11215 02-23)

Avail: NTIS HC A21/MF A01 CSCL 11/4

The magnitude of moisture effects on the transverse tensile properties of Kevlar 49/Fiberite 934 epoxy composites was examined. The transverse tensile test was selected so that failure modes could be determined by scanning electron microscopy. Results indicate that saturation moisture concentrations cause substantial reductions in transverse properties at 25 C compared to dry control values. Ultimate strength and elongation are observed to decrease respectively by 35 and 27 percent. Composite transverse stiffness is less sensitive to moisture, but is degraded by 14 percent. Microscopy of the fracture surfaces reveals that property reductions are accompanied by a change in failure mode from an interface dominated mechanism in the dry condition to one of filament splitting at saturation moisture contents. Increased filament compliance and the splitting failure mode may be a consequence of moisture interrupting the interchain hydrogen bonding of the Kevlar 49 filaments. Author

N83-11226# Wyoming Univ., Laramie. Composite Materials Research Group.

INFLUENCE OF MOISTURE ON COMPRESSIVE FATIGUE OF GRAPHITE/EPOXY COMPOSITES **c24**

Donald F. Adams *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 171-180 refs Sponsored by Naval Air Systems Command (For primary document see N83-11215 02-23)

Avail: NTIS HC A21/MF A01 CSCL 11/4

The combined infuence of temperature and moisture on the static compression and compressive fatigue properties of graphite/epoxy laminates was studied. Unidirectional laminates of Hercules AS/3501-6 graphite/epoxy were included. Scanning electron microscopy disclosed extensive fiber-matrix debonding, longitudinal cracking, ply delaminations, and fiber microbuckling. Relatively few differences were observed between static compression failure modes and compression fatigue failure modes. Typical failure modes were identified and cataloged, and related to analytical predictions of internal stress distributions at the experimentally measured failure levels. The influences of temperature and moisture on both stiffness and strength properties were predicted, and correlated with test results. Several analytical tools and correlation techniques were developed. The correlations with experimental data indicate that they represent a significant advance in the ability to predict the nonlinear response and strength of actual composites. A.R.H.

N83-11227# Southwest Research Inst., San Antonio, Tex.

DETERMINATION OF MOISTURE IN FIBER REINFORCED COMPOSITES USING PULSED NMR **c24**

George A. Matzkanin *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 181-198 refs (For primary document see N83-11215 02-23)

(Contract DLA900-79-C-1266)

Avail: NTIS HC A21/MF A01 CSCL 11/4

Nuclear magnetic resonance (NMR) signals from hydrogen atoms in two organic matrix composite systems subjected to environmental conditioning at 51.6 C (125 F) and 95% relative humidity were examined. The composites were 8 ply, + or - 45 deg laminates fabricated from SP 250 resin/S2 glass fiber and Reliabond 9350 resin/Kevlar 49 fiber. Free induction decay NMR signals from the composite specimens consisted of a large amplitude, fast decaying component associated with hydrogen in rigid polymer molecules and a lower amplitude, slower decaying component associated with hydrogen in the mobile absorbed moisture molecules. The absorbed moisture NMR signals consists of distinct multiple components which were attributed to moisture in various states of molecular binding. Particularly complex free induction decay signals were observed from Kevlar composite as well as from Kevlar fiber. Good correlation was obtained between the NMR signal amplitude and the dry weight moisture percentage for both composite systems. Results of destructive tensile tests were examined. A.R.H.

N83-11228# Virginia Polytechnic Inst. and State Univ., Blacksburg.

THERMOGRAPHY AS AN OBSERVATIONAL AND PREDICTIVE METHOD FOR DYNAMIC LOADING OF COMPOSITE STRUCTURES **c24**

E. G. Henneke, II, S. S. Russell, and K. L. Reifsnider *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 199-208 refs (For primary document see N83-11215 02-23)

(Contracts F33615-77-C-5044; DAAG29-81-K-0017; Grant DAAG29-79-G-0037)

Avail: NTIS HC A21/MF A01 CSCL 11/4

Vibrothermography consists of the study of thermographic (heat) patterns which are recorded or observed in real time during a specific vibrational excitation. The details of the mechanisms which produce such dissipative heat are directly related to the mechanisms of material deformation and degradation in several important ways. The appliation of the large amplitude active heating thermography scheme to the detection of damage in a helicopter rotor blade during full scale testing at a resonant frequency of about 13 Hz is described. The effort was successful in that a region of damage was located which, later, was identified by the other nondestructive evaluation techniques, and which was the general location of eventual failure of a rotor blade. Operational and interpretational information regarding the effort are discussed. A.R.H.

N83-11229# Sira Inst. Ltd., Chislehurst (England).

THERMOELASTIC STRESS ANALYSIS **c24**

L. R. Baker and J. M. B. Webber *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 209-220 refs (For primary document see N83-11215 02-23)

Avail: NTIS HC A21/MF A01 CSCL 11/4

The necessity of measuring the distribution of stress on the surface of a structure under load; the connection between stress concentration; and mechanical design and safety are discussed and the thermoelastic stress analysis (TSA) technique are described. For given material constants, the change in temperature on the surface of a structure, subject to dynamic loading, is directly proportional to the change in stress at that point. A specially designed high sensitivity IR camera is described which can present a color display of the distribution of stress which could arise from temperature variations as small as 0.001 K resulting from a few units of micro strain in metals. A selection of typical results obtained by recording the stress concentration on the surface of a model pedestal structure are given to illustrate how TSA could be used as an aid to design. A.R.H.

N83-11230# California Univ., Livermore. Lawrence Livermore Lab.

LOCAL CHARACTERIZATION OF FIBER COMPOSITES BY ACOUSTIC EMISSION **c24**

M. A. Hamstad *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 221-230 (For primary document see N83-11215 02-23)
(Contract W-7405-eng-48)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The performance of a fiber composite article is often critically dependent upon the local conditions throughout the composite as matrix crack density, fiber damage or fraying, matrix content, matrix cure, moisture content, residual stress field and matrix to fiber bonding. Without a proper characterization of those local conditions, analytical descriptions of composite performance and failure are inadequate. The local conditions of a composite article in service were determined by two important factors: the local conditions that were originally fabricated and the modification of these conditions by the macroscopically distributed microfailure and deformation which occurred during proof testing and/or loading the composite article when it was put into service as well as the modification of these conditions during service life. Acoustic emission (AE) is useful in characterizing the original fabricated local conditions and in monitoring and characterizing the change in these conditions as a result of proof testing and service loading. Examples of the use of AE for these purposes are given.
A.R.H.

N83-11231*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACOUSTO-ULTRASONIC CHARACTERIZATION OF FIBER REINFORCED COMPOSITES **c24**
Alex Vary *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 231-242 refs Document previously announced as N81-28458 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The advantageous aspects of acoustic emission and ultrasonic methodologies are combined in a technique which operates by introducing a repeating series of ultrasonic pulses into a material. The waves introduced simulate the spontaneous stress waves that would arise if the material were put under stress as in the case of acoustic emission measurements. These benign stress waves are detected by an acoustic emission sensor. The physical arrangement of the ultrasonic (input) transducer and acoustic emission (output) sensor is such that the resultant waveform carries an imprint of morphological factors that govern or contribute to material performance. The output waveform is quite complex, but it can be quantitized in terms of a 'stress wave factor'. The stress wave factor, which can be defined in a number of ways, is essentially a relative measure of the efficiency of energy dissipation in a material. If flaws or other material anomalies exist in the volume being examined, their combined effect will appear in the stress wave factor.
Author

N83-11232# Army Materials and Mechanics Research Center, Watertown, Mass.
APPLICATION OF FOURIER TRANSFORM INFRARED SPECTROSCOPY FOR QUALITY CONTROL ANALYSIS OF EPOXY RESIN PREPREGS USED IN HELICOPTER ROTOR BLADES **c27**
T. F. Saunders, M. Ciulla, S. Wehner, and J. Brown *In its* Proc. of the Critical Rev. May 1982 p 243-250 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/3

Fourier transformation infrared (FT-IR) spectroscopy provides enough information from a single spectrum, with five functional group peak absorbances being measured, to allow acceptance or rejection of lots of prepreg. FT-IR allows reproducible quantitative absorbance determinations of the 3400/cm -OH, 2180/cm -C (triple bond) N, 1140/cm aliph. ether and 915/cm epoxide. Spectra are obtained on thin films of THF/DMF extracts from the epoxy/glass prepreg cast on KBr plates. ATR spectra were not good enough for precise quantitative determination.
A.R.H.

N83-11233# Vought Corp. Advanced Technology Center, Inc., Dallas, Tex.
NEUTRON RADIOGRAPHIC NON-DESTRUCTIVE INSPECTION OF COMPOSITE AND COMPOSITE/METAL STRUCTURES **c24**
W. E. Dance *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 253-264 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The use of neutron radiography for nondestructive inspection of a variety of composite and mixed composite/metal structures is being explored. Radiographic data are presented which illustrate the sensitivity of this method for imaging defects in laboratory specimens of complex, difficult to inspect structures. In some cases neutron radiography provides a direct complement to X-ray inspection, with resin porosity being imaged by the neutrons and the fiber distribution patterns being imaged by X-ray. In other cases involving complex adhesively bonded composite/metal structures, neutron radiography provides the only existing accurate and reliable method of imaging certain types of bondline deficiencies. Radiographic results are presented from three types of neutron sources, including californium-252, Van de Graaff accelerator, and a mobile on-off neutron radiography system engineering model.
Author

N83-11234# Lockheed Missiles and Space Co., Palo Alto, Calif.
RELATION BETWEEN INTERFACIAL PHENOMENA AND ADHESIVE BOND STRENGTH **c27**
Arthur D. Jonath and Joe L. Crowley *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 265-290 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/1

Structural adhesive systems whose cure/crosslink mechanisms appear to be influenced by the adjacent bonding surfaces are considered. Mechanical (ultrasonic probe and locus-of-fracture) and electronic (thermally stimulated dipole relaxation) properties were measured in the adhesive throughout the interfacial region. The results indicate that microstructural gradients persist a considerable distance in the bulk of the adhesive. An approach is proposed which sets aside the force/energy considerations for bond formation in favor of entropic arguments connected with nucleation and growth processes. These are seen more clearly in a model of describing the deposition of simple inorganic amorphous polymer structures such as occur in types of hydrogenated amorphous silicon. An extention of this model to organic polymer adhesives is suggested.
A.R.H.

N83-11235# Materials Research Labs., Melbourne (Australia).
STUDIES OF THE CHARACTERIZATION OF ORGANIC MATERIALS BY NON-STATIONARY CHEMILUMINESCENCE TECHNIQUES
G. A. George and D. M. Pinkerton *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 291-310 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 07/3

The technique of non-stationary chemiluminescence involves measuring the weak light emitted from an organic material when its environment is perturbed. This perturbation may involve either stressing the material, briefly UV irradiating it or changing the gas above the heated polymer from an inert to an oxidizing atmosphere. In all cases, the effect of the perturbation is to create a transiently high concentration of free radicals in the material. The rate at which the material reaches the steady state in the new environment, as given by the change in the chemiluminescence intensity, is a measure of the rate of specific free radical reactions in the material. The rates of these reactions are very sensitive to the presence of trace impurities, initiators, stabilizers and the micro-environment of the material. Application of this technique to epoxy resins and other composites is discussed.
A.R.H.

N83-11236# McDonnell-Douglas Research Labs., St. Louis, Mo.
THE USE OF CHEMILUMINESCENCE TO MONITOR THE AGING PROCESSES IN POLYMERS AND COMPOSITES **c27**
Clarence J. Wolf and Dale L. Fanter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 311-324 (For primary document see N83-11215 02-23)

(Contract N00019-80-C-0102)
Avail: NTIS HC A21/MF A01 CSCL 11/7

The separate and combined environmental effects of temperature, humidity, and mechanical stress on the chemiluminescence (CL) from epoxy resin systems are discussed. A rapid or real time aging test for use of a short test to predict the long term properties of a material was developed. Chemiluminescence (CL), a relatively common phenomenon in which part of the energy of a exoergic chemical reaction is released in the form of electromagnetic radiation, is a technique to monitor the degradation processes occurring during the aging of polymeric materials. E.A.K.

N83-11237# Northwestern Univ., Evanston, Ill. Materials Research Center.
THERMALLY STIMULATED DISCHARGE MEASUREMENT AND PROPERTY CHARACTERIZATION OF EPOXY RESIN SYSTEMS **c27**
J. O. Brittain, S. H. Carr, and T. D. Chang *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 325-338 (For primary document see N83-11215 02-23)
(Grant NSF DMR-76-80847)
Avail: NTIS HC A21/MF A01 CSCL 11/7

Thermally Stimulated Depolarization (TSD) measurements were made on a series of epoxy resins to determine the effect of chemical composition and post curing upon the TSD relaxation spectra from about 100 deg K to above T sub q. The extent of curing was determined via infrared spectroscopy measurements of absorbance of the epoxy group at 910 cm. The DSC was used to determine T sub q at a heating rate of 10 deg C/min. It is shown that the epoxy cured with diamine generally has two secondary relations of localized origins. The beta-relaxation at about 185 deg K increased in strength and occurred at a higher temperature with an increase in the extent of curing. The TSD gamma-relaxation at 115 deg K did not change with the extent of curing. E.A.K.

N83-11238# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemical Engineering.
PHYSICAL AGING STUDIES OF EPOXY RESINS WITH EMPHASIS ON GRAPHITE FIBER-EPOXY COMPOSITES **c27**
Yousef Mohajer, Elaine Yorkgitis, Garth Wilkes, and James McGrath *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 339-370 refs Document also anounced as A82-11293 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

The effects of physical aging on the material properties of some linear and network macromolecular glasses are reviewed. The effect of physical aging on properties of some uniaxial graphite/fiber epoxy resin composites was investigated by stress-relaxation in both tensile and flexural modes. The matrix resin was found to be not fully cured and the glass transition of the network was found to be dependent on the curing schedule. The physical aging of the composite, monitored by the stress relaxation method, was found to be dependent on the testing direction. When the test direction was perpendicular to the fiber direction (series model), the composite showed a considerable amount of stress relaxation in that it displayed a significant change in the percent stress relaxation with time. It is found that the value of the percent stress relaxation was lower than that of the bulk resin. No aging effect was observed when the test direction was parallel to the fiber. It is concluded that although the matrix displays changes in properties with time, the composite, depending on the test direction, may or may not provide evidence of physical aging. E.A.K.

N83-11239# Washington State Univ., Pullman. Dept. of Physics.
FRACTO-EMISSION FROM COMPOSITES **c24**
J. T. Dickinson *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 371-386 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The emission of electrons and positive ions from materials undergoing fracture is reported. A survey of charged particle emission from a number of materials including crystalline insulators, glass, graphite, polymers, and composites is presented. Fiber reinforced epoxy systems which yield unique forms of charge emission are examined. Energy distributions of the emitted particles are given for E-glass/epoxy strands, polybutadiene filled with glass beads, and mica. Surface charging accompanying fracture of these samples was measured. It is shown that interfacial failure and charge separation play important roles in the observed emission. E.A.K.

N83-11240# Case Western Reserve Univ., Cleveland, Ohio.
MOLECULAR CHARACTERIZATION OF COMPOSITE INTERFACES **c24**
H. Ishida *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 387-400 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

The Fourier Transform Infrared Spectroscopy was applied to elucidate the molecular structures of the glass/matrix interface. The various interfaces and interphases were studied. It is found that the structure of the silane in a treating solution is important in determining the structure of the silane on glass fibers, influences the macroscopic properties of composites. The amount of silane on glass fibers, the state of hydrogen bonding, orientation, copolymerization of the organicfunctionality with the matrix, curing of the silane, and effect of water on the interface were investigated. It is shown that the molecular approach is useful to interpret and predict physicomechanical properties of composites. E.A.K.

N83-11241# Naval Surface Weapons Center, White Oak, Md.
CALCULATION OF STRUCTURAL PARAMETERS IN MODEL EPOXY SYSTEMS **c27**
Bruce Hartmann and Gilbert F. Lee *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 401-414 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

Additive properties were applied to a series of eight cross-linked epoxy/amine polymers. Properties of the four independent structural components of these polymers were determined from experimental measurements. The approach was applied to: density, thermal expansion coefficient, heat capacity, bulk modulus, and shear modulus. The moduli and heat capacity results were obtained as a function of temperature while the other properties were only done at room temperature. Using these structural parameters, polymer properties were calculated and the predictions are in agreement with the measurements to within the accuracy of the measurements. E.A.K.

N83-11242# Naval Research Lab., Washington, D. C.
THE FRACTURE OF ELASTOMER MODIFIED EPOXIES IN BULK AND AS MATRIX RESINS **c27**
W. L. Bascom *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 415-422 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

The interlaminar fracture of glass and graphite fabric composites was studied. A double cantilever beam specimen was used that was width tapered for constant change in compliance with crack length so that the fracture energy calculation is independent of crack length. It was found that the interlaminar fracture energy could be significantly increased, either by the addition of elastomeric toughening agents to the epoxy matrix, or by using a thermoplastic matrix resin instead of an epoxy. The largest increase in interlaminar fracture energy was obtained for an epoxy matrix/graphite fabric composite by the addition of elastomeric modifiers. E.A.K.

N83-11243*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DURABILITY OF COMMERCIAL AIRCRAFT AND HELICOPTER COMPOSITE STRUCTURES **c24**
H. Benson Dexter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 423-452 (For

primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11D

The development of advanced composite technology during the past decade is discussed. Both secondary and primary components fabricated with boron, graphite, and Kevlar composites are evaluated. Included are spoilers, rudders, and fairings on commercial transports, boron/epoxy reinforced wing structure on C-130 military transports, and doors, fairings, tail rotors, vertical fins, and horizontal stabilizers on commercial helicopters. The development of composite structures resulted in advances in design and manufacturing technology for secondary and primary composite structures for commercial transports. Design concepts and inspection and maintenance results for the components in service are reported. The flight, outdoor ground, and controlled laboratory environmental effects on composites were also determined. Effects of moisture absorption, ultraviolet radiation, aircraft fuels and fluids, and sustained tensile stress are included. Critical parameters affecting the long term durability of composite materials are identified. E.A.K.

N83-11244# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Mechanics and Surface Interactions Branch.
SURFACE CHARACTERIZATION OF GRAPHITE FIBERS c24
Lawrence T. Drzal *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 453-472 refs
(For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

Application of surface characterization techniques must be applied to provide the required information on fiber matrix adhesion. These techniques are: surface spectroscopics, atomic and molecular information; thermal desorption, quantificaton of material desorbed from the fiber surface during the processing of cycle; surface energetics, measurement of the efficacy of surface groups in air; single filament measurements, quantification of interfacial strength, fracture mode and fracture energy; microtomy and microscopy, determination of locus of failure and fracture path. It is suggested that these techniques provide the methodology to characterize fiber surfaces in the context of composite performance. E.A.K.

N83-11245# Rockwell International Science Center, Thousand Oaks, Calif.
REPORT ON QUESTIONNAIRE FOR CHEMICAL CHARACTERIZATION OF COMPOSITE RELIABILITY c24
D. H. Kaelble *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 474-491 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

A questionnaire was compiled on the chemical characterization of polymer composites. The characterization methods covered by the questionnaire's field of interest include: (1) elemental analysis; (2) spectroscopy (IR, MS, NMR, atomic, all types); (3) chromatography (HPLC, GPC, GC, all types); (4) calorimetry; (5) rheology; (6) dieletrometry; and (7) relevant ASTM methods. The purpose of the survey is to present an overview of the subject Chemical Characterization of Composite Reliability. E.A.K.

24 COMPOSITE MATERIALS

Includes laminates.

N83-11246# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
XPS STUDY OF RADIATION-DAMAGED Si-SiO2 INTERFACES
P. A. Bertrand, P. D. Fleischauer, and Y. Song 30 Sep. 1982 28 p refs
(ATR-82(8453)-1) Avail: NTIS HC A03/MF A01

Interfacial defects caused by electron beam irradiation in a scanning electron microscope of device quality Si-SiO2 structures were observed directly by X-ray photoelectron spectroscopy (XPS). Radiation hard oxides (approximately 700 A thick) on Si were subjected to 20 keV electron bombardment and several annealing treatments. The radiation induces defects at the semiconductor oxide interface that were identified by XPS as Si with three bonds to oxygen and one dangling bond. The state anneals slowly (in a few days) at room temperature, but is removed within 30 min by N2 or forming gas (90% N2 + 10% H2) anneals at 400 C. Although electron beam irradiation of thin (45 A) oxide structures is known to produce interface states with similar properties, this is the first report of XPS identification of states produced on device quality materials under standard processing conditions (i.e., those used for e-beam writing). Author

N83-11247*# Fiber Materials, Inc., Biddeford, Maine.
ALUMINA FIBER STRENGTH IMPROVEMENT Final Report
R. T. Pepper and D. C. Nelson Sep. 1982 53 p refs
(Contract NAS3-22154)
(NASA-CR-167999; NAS 1.26:167999) Avail: NTIS HC A04/MF A01 CSCL 11D

The effective fiber strength of alumina fibers in an aluminum composite was increased to 173,000 psi. A high temperature heat treatment, combined with a glassy carbon surface coating, was used to prevent degradation and improve fiber tensile strength. Attempts to achieve chemical strengthening of the alumina fiber by chromium oxide and boron oxide coatings proved unsuccessful. A major problem incountered on the program was the low and inconsistent strength of the Dupont Fiber FP used for the investigation. Author

N83-11248*# Boeing Commercial Airplane Co., Seattle, Wash.
ADVANCED COMPOSITE ELEVATOR FOR BOEING 727 AIRCRAFT Quarterly Technical Progress Report, 23 May - 22 Aug. 1978
22 Aug. 1978 91 p refs
(Contract NAS1-14952)
(NASA-CR-157823; NAS 1.26:157823; QTPR-5) Avail: NTIS HC A05/MF A01 CSCL 11D

Detail design activities are reported for a program to develop an advanced composites elevator for the Boeing 727 commercial transport. Design activities include discussion and results of the ancillary test programs, sustaining efforts, weight status, manufacturing producibility studies, quality assurance development, and production status. Author

N83-11249# Lockheed-California Co., Burbank. Structures and Materials Lab. Dept.
EFFECT OF LOAD HISTORY ON FATIGUE LIFE Final Technical Report, 1 Jan. 1980 - 30 Apr. 1981
J. T. Ryder and K. N. Lauraitis Wright-Patterson AFB, Ohio AFWAL Dec. 1981 281 p refs
(Contract F33615-78-C-5090)
(AD-A118084; LR-29586-1; AFWAL-TR-81-4155) Avail: NTIS HC A13/MF A01 CSCL 11/4

The primary objectives of this program were to: (1) investigate the effects of mechanical load history on the response of laminated graphite/epoxy composites; and (2) to analyze the results in a manner such that an expanded foundation is laid for formulating cumulative damage concepts. The research investigation was divided into three tasks: Task I, Diagnostic Experimentation; Task II, Effect of Loading Parameters; and Task III, Data Analysis and Reporting. In Task I, the laminate of interest was selected as a quasi-isotropic layup of T300/5208 graphite/epoxy material. The unidirectional properties of the material were characterized at room temperature and at 82.2 C (180 F) in both an as-received and a high moisture content condition. Moisture absorption and thermal expansion properties of the laminate were obtained. Static tension and compression properties of the quasi-isotropic laminate as well as those for unidirectional laminates were determined. During Task II, different types of mechanical load histories were applied, at room temperature, to coupons of the selected quasi-isotropic laminate. Distributions of either monotonic strength or cyclic life, which ever was appropriate, were obtained for the various applied load histories. GRA

N83-11250# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Strukturberechnung.
STRESSES AND DEFORMATIONS IN LAMINATED TEST SPECIMENS OF CARBON FIBER REINFORCED COMPOSITES
Klaus Rohwer May 1982 83 p refs
(DFVLR-FB-82-15) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 27,50

Edge effects in test specimens of laminated fiber reinforced composites were studied. The finite element method was applied in order to calculate stresses and displacements under axial load and temperature decrease. A comparison with published results on four-layer specimens shows good agreement, but also makes obvious that it is essential to display the complete stress fields. Sixteen-layer specimens with three different stacking sequences are analyzed. The stress distributions can be utilized as an orientation for design improvement. Author (ESA)

N83-11251# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN, FABRICATION AND TESTING OF AN ADVANCED COMPOSITE ACCESS DOOR FOR USE IN A LOWER WING PANEL
J. C. Dardelet and W. H. M. vanDreumel Oct. 1981 29 p refs (VTH-LR-335) Avail: NTIS HC A03/MF A01

For reasons of comparison, the dimensions and the load specification of a Fokker F-27 Friendship hatch at station 5000 were chosen. The panel is designed as a carbon fiber sandwich construction in which the laminate type and thickness are determined by the strength of the mechanical joint. A full scale tensile test was carried out and a weight comparison was made with the original aluminum hatch. Author (ESA)

N83-11047# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF MICROSTRUCTURE OF CARBON-ALUMINUM COMPOSITES
Zheng Lide, Zhang Guoding, Wang Wenrong, and Shi Peiyuan *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 150-157 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 11/4

N83-11217# Army Materials and Mechanics Research Center, Watertown, Mass. Composites Development Div.
ACOUSTIC EMISSION DURING CURE OF FIBER REINFORCED COMPOSITES
Y. L. Hinton, R. J. Shufored, and W. W. Houghton *In its* Proc. of the Critical Rev. May 1982 p 25-36 ref (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11219# Westinghouse Research and Development Center, Pittsburgh, Pa.
MONITORING CURE OF LARGE AUTOCLAVE MOLDED PARTS BY DIELECTRIC ANALYSIS
J. Chottiner, Z. N. Sanjana, M. R. Kodani, K. W. Lengel, and G. B. Rosenblatt *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 59-70 refs Prepared in cooperation with Westinghouse Electric Corp., Sunnyvale, Calif. (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11221# Army Materials and Mechanics Research Center, Watertown, Mass. Composites Development Div.
EFFECTS OF MOISTURE ON THE MECHANICAL PROPERTIES OF GLASS/EPOXY COMPOSITES
C. D. Douglas and E. R. Pattie *In its* Proc. of the Critical Rev. May 1982 p 89-96 refs Document also announced as A82-29036 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11222# Bristol Univ. (England). Physics Lab.
ACCOMMODATION AND RELAXATION OF STRAIN DURING MOISTURE SORPTION
K. H. G. Ashbee, J. P. Sargent, and Elizabeth Walter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 97-104 Sponsored in part by Science Research Council, England (For primary document see N83-11215 02-23)
(Grant DA-ERO-78-G-117)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11223# McDonnell-Douglas Research Labs., St. Louis, Mo.
SPATIAL DISTRIBUTION OF VOLATILE COMPOUNDS IN EPOXY RESINS FOR COMPOSITES
M. A. Grayson and C. J. Wolf *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 107-117 (For primary document see N83-11215 02-23)
(Contract DAAG46-80-M-1371)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11224# Naval Surface Weapons Center, White Oak, Md.
MECHANISTIC AND PHENOMENOLOGICAL THEORIES FOR PREDICTING COMPOSITE BEHAVIOR AND ENVIRONMENTAL EFFECTS
Joseph M. Augl *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 119-156 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11225# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
THE INFLUENCE OF MOISTURE ON THE TRANSVERSE MECHANICAL BEHAVIOR OF KEVLAR 49/EPOXY COMPOSITES AT 25 DEG C
Ronald E. Allred and David K. Roylance *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 157-170 refs Sponsored by DOE (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11226# Wyoming Univ., Laramie. Composite Materials Research Group.
INFLUENCE OF MOISTURE ON COMPRESSIVE FATIGUE OF GRAPHITE/EPOXY COMPOSITES
Donald F. Adams *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 171-180 refs Sponsored by Naval Air Systems Command (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11227# Southwest Research Inst., San Antonio, Tex.
DETERMINATION OF MOISTURE IN FIBER REINFORCED COMPOSITES USING PULSED NMR
George A. Matzkanin *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 181-198 refs (For primary document see N83-11215 02-23)
(Contract DLA900-79-C-1266)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11228# Virginia Polytechnic Inst. and State Univ., Blacksburg.
THERMOGRAPHY AS AN OBSERVATIONAL AND PREDICTIVE METHOD FOR DYNAMIC LOADING OF COMPOSITE STRUCTURES
E. G. Henneke, II, S. S. Russell, and K. L. Reifsnider *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 199-208 refs (For primary document see N83-11215 02-23)
(Contracts F33615-77-C-5044; DAAG29-81-K-0017; Grant DAAG29-79-G-0037)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11229# Sira Inst. Ltd., Chislehurst (England).
THERMOELASTIC STRESS ANALYSIS
L. R. Baker and J. M. B. Webber *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 209-220

refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11230# California Univ., Livermore. Lawrence Livermore Lab.
LOCAL CHARACTERIZATION OF FIBER COMPOSITES BY ACOUSTIC EMISSION
M. A. Hamstad *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 221-230 (For primary document see N83-11215 02-23)
(Contract W-7405-eng-48)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11231*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACOUSTO-ULTRASONIC CHARACTERIZATION OF FIBER REINFORCED COMPOSITES
Alex Vary *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 231-242 refs Document previously announced as N81-28458 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11233# Vought Corp. Advanced Technology Center, Inc., Dallas, Tex.
NEUTRON RADIOGRAPHIC NON-DESTRUCTIVE INSPECTION OF COMPOSITE AND COMPOSITE/METAL STRUCTURES
W. E. Dance *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 253-264 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11239# Washington State Univ., Pullman. Dept. of Physics.
FRACTO-EMISSION FROM COMPOSITES
J. T. Dickinson *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 371-386 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11240# Case Western Reserve Univ., Cleveland, Ohio.
MOLECULAR CHARACTERIZATION OF COMPOSITE INTERFACES
H. Ishida *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 387-400 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11243*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DURABILITY OF COMMERCIAL AIRCRAFT AND HELICOPTER COMPOSITE STRUCTURES
H. Benson Dexter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 423-452 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11D

N83-11244# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Mechanics and Surface Interactions Branch.
SURFACE CHARACTERIZATION OF GRAPHITE FIBERS
Lawrence T. Drzal *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 453-472 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11245# Rockwell International Science Center, Thousand Oaks, Calif.
REPORT ON QUESTIONNAIRE FOR CHEMICAL CHARACTERIZATION OF COMPOSITE RELIABILITY
D. H. Kaelble *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 474-491 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-11252 National Physical Lab., Teddington (England). Div. of Materials Applications.
INTENSITY AND ENERGY CALIBRATION IN AES : THE EFFECT OF ANALYSER MODULATION
M. T. Anthony and M. P. Seah Jun. 1982 25 p refs
(NPL-DMA(A)-48) Copyright. Avail: Issuing Activity

The effects of the modulation amplitude and spectrometer resolution on the Auger electron line position and peak to peak amplitude were studied. The accuracy of theoretical predictions, and the transferability of data between instruments were examined. Tests with commercial instruments show that theoretical descriptions of the peak-to-background intensity dependence of the signal in the differentiated spectrum, and the precise position of the negative peak, are accurate if the calculations are based on a Gaussian peak shape. The description is independent of the spectrometer if it is properly modulated. Intensity description accuracy for singlet Auger electron peaks is > 3%. Peak shift predictions are applicable to quite complex peak structures to + or - 0.05 eV. Although intensity dependence is largely unaffected by distortion of the sinusoidal modulation, the peak shifts may be reduced by 25%. Author (ESA)

N83-11253 National Physical Lab., Teddington (England). Div. of Materials Applications.
AN ATOMIC STANDARD TO CALIBRATE ANALYSER MODULATION IN AES AND DETERMINE THE EQUIVALENCE OF COMPUTER DIFFERENTIATION
M. P. Seah and M. T. Anthony Jun. 1982 24 p refs
(NPL-DMA(A)-49; ISSN-0143-7313) Copyright. Avail: Issuing Activity

An atomic standard for the calibration of the differentiation of AES by either the sinusoidal potential modulation technique or by computer differentiation was characterized. For the Varian 10 keV, 0.3% resolution analyzer the effective modulation is a factor 1.2 times lower than expected at the normal 17 kHz operating frequency. For other spectrometers tested, no such factor is required. The effective modulation in eV for spectrometers with resolution > 1% can be calibrated with an accuracy of 3% by the use of measurements of the M45NN doublet for clean silver. A precision calibration occurs at 5eV ptp, and the remaining modulations can then be scaled linearly. For intensity calibration, this effective modulation is meaningful even if peak distortion occurs through small errors such as mains pick-up. Application of the procedure to the data in McGuire's manual shows that the effective modulation there is 1.6 times the quoted nominal modulation potential. Author (ESA)

N83-11254# National Inst. for Water Research, Pretoria (South Africa).
NIWR INTERLABORATORY COMPARISON STUDY NO. 81/A: NITROGEN AND PHOSPHOROUS ANALYSIS
R. Smith 1981 35 p refs
(CSIR-RR-398; ISBN-0-7988-2175-2) Avail: NTIS HC A03/MF A01

Part of a series of interlaboratory comparison studies involving southern African laboratories engaged in water and wastewater analysis is discussed. The analysis or synthetic water samples by 45 laboratories for ammonia, nitrate, and nitrite nitrogen, and orthophosphate is discussed. The results obtained and the methods used are evaluated and discussed. In most cases, recognized standard methods were used by the participating laboratories, and the results, in general, showed good accuracy and precision.
R.J.F.

N83-11255# Ballistic Research Labs., Aberdeen Proving Ground, Md.
TEMPERATURE PROFILE OF A STOICHIOMETRIC CH4/N2O FLAME FROM LASER EXCITED FLUORESCENCE MEASUREMENTS ON OH
William R. Anderson, Leon J. Decker, and Anthony J. Kotlar Jul. 1982 45 p refs
(DA Proj. 1L1-62618-AH-80)
(AD-A118383; AD-F300065; ARBRL-TR-02412) Avail: NTIS HC A03/MF A01 CSCL 21/2

The temperature profile of a stoichiometric CH4/N2O flame over a porous plug, atmospheric-pressure burner has been measured using laser excited fluorescence of the OH radical. The technique of rotationally resolved fluorescence excitation scans was extended to the (1,1) vibrational band of the A doublet sigma plus - X doublet pi system to avoid problems of laser beam depletion and self-absorption encountered by this group and previous workers using the (O,O) band. Absorption spectra were obtained in addition to fluorescence spectra. A least squares curve-fitting technique which accounts for the various types of line broadening was developed and applied to two absorption lines in the (O,O) band. The resulting temperature profile is compared to that from fluorescence data reduced using Boltzmann plots. The more complicated curve-fitting approach was later applied to five lines in the spectrum using several combinations of fluorescence and absorption data. Results of all the aforementioned methods were compared to those from OH band reversal and N2 vibrational Raman measurements at the same point in the post flame gases. Excellent agreement was achieved. The results are discussed with emphasis on both the fluorescence diagnostics and the characteristics of the CH4/N2O flame on the porous-plug burner.
GRA

N83-11256# Delaware Univ., Newark. Dept. of Physics.
OPTICAL AND ELECTRONIC PROPERTIES OF LUMINESCENT AND OF METASTABLE SOLIDS Final Report
David Berry and Ferd Williams 29 Jul. 1982 27 p refs
(Contract DAAG29-79-C-0041)
(AD-A118143; ARO-16164.10-PH) Avail: NTIS HC A03/MF A01 CSCL 07/4

Theoretical and experimental studies have been completed on donor-acceptor pair spectra including effects of electron-phonon interaction and on the effects of hydrostatic pressure on the luminescence of point and molecular dopants. The direct effect of pressure on the adiabatic potentials of the dopants and effects of anharmonicity of these potentials are included. Effects on vibronic spectra are determined. The theory of effects of hydrostatic pressure is extended to effects of uniaxial stress, thus unifying theoretical analyses of applied mechanical stress. GRA

N83-11257# Defence Research Establishment Suffield, Ralston (Alberta).
THE FLUOROMETRIC DETECTION OF PYRIDINIUM COMPOUNDS DERIVED FROM HI-6 AND HS-6
R. G. Smyth Mar. 1982 23 p refs
(AD-A118018; DRES-338) Avail: NTIS HC A02/MF A01 CSCL 15/2

The conditions required for the production of fluorophores from pyridinium compounds related to HI-6 and HS-6 were examined in detail. Fluorescence development was optimized to permit the reliable assay of microgram quantities of HI-6, HS-6, pyridine-2-aldoxime methochloride, N-1-methylnicotinamide, and N-1-methylisonicotinamide. Author (GRA)

N83-11258# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
COMPETING DISSOCIATION CHANNELS IN THE INFRARED MULTIPHOTON DECOMPOSITION OF ETHYL VINYL ETHER
F. Huisken, D. Krajnovich, Z. Zhang, Y. R. Shen, and Y. T. Lee 14 Jul. 1982 47 p refs Submitted for publication
(Contract N00014-75-C-0671; NR Proj. 092-545)
(AD-A118409) Avail: NTIS HC A03/MF A01 CSCL 07/3

Infrared multiphoton decomposition of ethyl vinyl ether (EVE) has been investigated by the crossed laser-molecular beam technique. Competition is observed between the two lowest-energy dissociation channels: (1) EVE yield CH3CHO + C2H4, and (2) EVE yield CH2CHO + C2H5. Center-of-mass product translational energy distributions were obtained for both dissociation channels. The products of reactions (1) and (2) are formed with mean translational energies of 31 kcal/mole and 5 kcal/mole, respectively. The branching ratio shifts dramatically in favor of the higher energy radical producing channel as the laser intensity and energy fluence are increased, in agreement with the qualitative predictions of statistical unimolecular rate theory. Author (GRA)

N83-11259# California Univ., Berkeley. Lawrence Berkeley Lab.
PHOTON STIMULATED ION DESORPTION Final Technical Report, Sep. 1979 - Oct. 1981
Christopher C. Parks 3 Mar. 1982 21 p refs
(Contract N00014-79-C-0855)
(AD-A118422) Avail: NTIS HC A02/MF A01 CSCL 07/4

This report summarizes a joint project by the University of California and the Naval Weapons Center, funded through Contract N00014-79-C-0855 from the Office of Naval Research (ONR). The project was supported from September 1979 to October 1981 by ONR, and concerned a newly discovered surface science technique, Photon Stimulated Ion Desorption (PSID). The goals in the project were of two types: (1) performance of experiments using existing and borrowed equipment and (2) developement of a time-of-flight angle resolved PSID spectrometer. The report will include a brief description of PSID, a description of experiments performed, and status of the apparatus under construction.
Author (GRA)

N83-11260# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
A STUDY OF CHEMICAL REACTIONS AND INTERACTIONS IN MICROEMULSION AND SURFACTANT PHASES Final Report, 1 May 1979 - 30 Apr. 1982
Raymond A. MacKay 19 Jul. 1982 45 p refs
(Contract DAAG29-79-C-0089)
(AD-A118130; ARO-16318.7-CH) Avail: NTIS HC A03/MF A01 CSCL 07/4

Carried out was a variety of chemical and physical studies in microemulsions phases formed from water, surfactant, oil, and an alcohol cosurfactant. These are istropic, stable, clear phases of low viscosity. Most of the work was performed in oil in water microemulsions consisting of oil droplets in an aqueous continuous phase. Cationic, anionic and nonionic surfactants have been employed. From transport measurements examined were the location of solutes, their diffusion rates, and degree of counterion dissociation in ionic systems. An electro chemical method for the determination of droplet size has been developed. From kinetic studies of phosphate ester-nucleophile reactions, a quantitative ion-exchange model has been developed. This model has been shown to be consistent with both the kinetic data and acid-base indicator equilibrium data. Surface bound aldoxinate nucleophile has been shown to be more effective than hydroxide in ester hydrolysis. Other reactions of inorganic ions have also been examined, and borohydride ion has been shown to react with chloroethyl ethyl sulfide in a cationic microemulsion. These results clearly demonstrate the utility of microemulsion for both fundamental studies and for application to such problems as solubilization, catalysis, and chemical decontamination. Author (GRA)

N83-11261# EIC, Inc., Newton, Mass.
PHOTOELECTROCHEMICAL CELLS BASED ON n-GaAS AND THE Cu(2)/Cu(1) REDOX COUPLE IN ACETONITRILE
Margaret E. Langmuir, Maureen A. Perker, and R. David Rauh Aug. 1982 20 p refs Presented at the 160th Electrochem. Soc. Symp. on Photoelectrochem. Processes and Measurement Techniques for Photoelectrochem. Solar Cells, Denver, 11-16 Oct. 1981
(Contract N00014-79-C-0700)
(AD-A118249; C-598; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

In acetonitrile, the potential of the Cu (II)/Cu(I) redox couple

is very dependent on the coordinating strength of the anion present. In the presence of perchlorate or nitrate, the potential is not within the GaAs band gap, and the redox couple does not stabilize GaAs with respect to photodecomposition. Chloride ion, which coordinates with both cations, shifts the potential within the band gap and stabilization of the semiconductor can be obtained.
Author (GRA)

N83-11262# Rockwell International Science Center, Thousand Oaks, Calif.
CHEMICAL PRODUCTION OF EXCITED NF Final Report
R. D. Coombe, D. Patel, A. T. Pritt, Jr., and F. J. Wodarczyk Jul. 1982 126 p refs
(Contract F29601-79-C-0016)
(AD-A118017) Avail: NTIS HC A07/MF A01 CSCL 07/4

The a singlet delta and b singlet sigma(+) states of NF, NCl and NBr can be efficiently generated by reactions of F+HN3 followed by halogen atom reactions with the azide radical, N3. Scalability of these systems is sensitive to the buildup of N3 concentrations since N3+N3 reactions undermine the overall efficiency. Large concentrations of N3 are encountered when the halogen atom reaction with N3 is significantly slower than its formation step, F+HN3. Hence scaling of NF (a singlet delta) is not feasible, but that of NCl(b singlet sigma(+)) and NBr(b singlet sigma(+)) shows promise. A diagnostic tool sensitive to optical gains or absorptions of less than 0.000002 per cm. was developed. In the NCl flame, the medium was transparent everywhere to the diagnostic probe, indicating fast removal of NCl(singlet sigma(+)) by reactions with Cl and/or F atoms which are present in large excess. Strong absorptions were observed in the NBr flame in accord with an expected short radiative lifetime of the singlet sigma(+) state. Energy transfer from NF(singlet sigma(+)) to atomic Bi generating the 6(doublet)D(3/2) metastable state proceeds at gas kinetic rates. Using a single frequency CW dye laser, the first high resolution spectrum Bi 6(quadruplet)S3/2-6 (doublet)D(3/2) was measured, and the radiative lifetime of the 6(doublet)D(3/2) state determined. Although an NF-Bi gain experiment was not performed, the appropriate diagnostic system was demonstrated. Author (GRA)

N83-11263# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SPECTROGRAPHIC ANALYSIS OF IODINE EMISSION M.S. Thesis
James J. Baer Jun. 1982 55 p refs
(AD-A118063; AFIT/GAE/AA/81D-3) Avail: NTIS HC A04/MF A01 CSCL 07/4

The 2-inch I.D. gas dynamic shock tube at the Air Force Institute of Technology, Wright-Patterson AFB, was used to examine the infrared emission spectrum of iodine in the 1.1-1.5 micron range. A reflected shock wave passing through the test gas generated the high temperature that was necessary to dissociate the iodine, and cause infrared emissions. Helium gas was used as the driver gas, and argon gas was used in the driven (test) section of the tube. The infrared emission was passed through a grating spectrometer (1200 lines;mm, 121,000 total lines) and was detected at the outlet slit with a liquid nitrogen cooled indium-antimonide IR detector. Control tests were run without iodine to verify that the spectrometer and IR detector were working properly during which time strong argon lines were observed. Subsequent tests revealed the infrared emissions characteristics of iodine in the 1.1-1 5 micron range. There is sufficient evidence to suggest that the 1.3151 micron electronic mode was excited; however, there may not have been a high enough energy state to extract energy in the lasing mode. The test section condition that was generated during observation of the 1.3151 micron line was T(5) of approximately 5000 R. GRA

N83-11264# Michigan State Univ., East Lansing. Dept. of Chemistry.
EFFECT OF LOW ILLUMINATION DURING OXIDATION-REDUCTION CYCLES UPON SURFACE-ENHANCED RAMAN SCATTERING FROM SILVER ELECTRODES
F. Barz, J. G. Gordon, M. R. Philpott, and M. J. Weaver Jul. 1982 16 p refs Submitted for publication Sponsored in part by AFOSR
(Contract N00014-79-C-0670)
(AD-A118312; TR-8) Avail: NTIS HC A02/MF A01 CSCL 07/4

The intensity of surface-enhanced Raman scattering from thiocyanate and chloride adsorbed at silver electrodes is shown to depend critically on whether the electrode is illuminated during the oxidation-reduction cycle (ORC) used to pretreat the electrode. The nature and magnitude of the photoeffect is dependent upon the type of surface vibrational mode, the adsorbate, and the wavelength of the irradiation during the ORC. GRA

N83-11265# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SORPTION OF SARIN VAPORS IN RUBBERS AND GUMS, PARTS 1 AND 2
S. Michalek 22 Jul. 1982 31 p refs Transl. into ENGLISH from Biuletyn Wojskowsj Akad. Tech. Im. J. Dabrowskieco (Poland), v. 28, no. 1(317), Sep. 1979 p 61-80
(AD-A118250; FTD-ID(RS)T-0178-82) Avail: NTIS HC A03/MF A01 CSCL 11/10

Sorption and sorption kinetics of vapors of the isopropyl ester of methylfluoro phosphonic acid (sarin) in rubbers: natural, isoprene, butadiene, and butadiene-styrene are discussed. The interction parameters for rubber-sarin were calculated from the sorption isotherms, and on the basis of the kinetic measurements, the diffusion coefficients were found for sarin vapors in the rubbers studied. GRA

N83-11266# SRI International Corp., Menlo Park, Calif.
EXPERIMENTAL EXTINGUISHMENT OF FIRES BY BLAST Final Report
Jana Backovsky, Stanley B. Martin, and Robert McKee May 1982 104 p refs
(Contract EMW-C-0559; SRI Proj. PYU-3341)
(AD-A117625) Avail: NTIS HC A06/MF A01 CSCL 15/6

Experiments on extinction of fires by airblast were continued in the shocktube facility dedicated to blast/fire interactions studies, and the facility was further improved toward a full, thermal/blast simulation capability, which will include a thermal radiation source. The experimental efforts were aimed toward improving our understanding of the physical mechanisms and scaling rules of blast extinguishment of fires through (1) tests with various common liquid (class B) fuels of different physicochemical properties and burning behavior and (2) tests with wood cribs of various element (stick) thicknesses and consequently varying burning behavior and time scales. Limited shocktube tests were also conducted in preparation for the MILL RACE event featuring blast extinction of fires on cellulosic debris. Author (GRA)

N83-11267# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Chemie.
INVESTIGATION OF KINETICS AND REACTION ENGINEERING FOR FISHER-TROPSCH SYNTHESIS OF 1-ALKENES FROM C4 TO C20 Final Report, Apr. 1981
Johann Gaube, Guenter Hochstadt, Bjoern Schliebs, and Guenter Sudheimer Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 125 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-148; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26,50

In order to calculate the selectivity of the synthesis, the kinetics of the main and secondary reactions were studied. Tests were conducted in fixed bed and fluidized bed reactors in the presence of iron catalysts containing K2C03. The conclusions concerning the technical synthesis of 1-alkynes are: the choice of the correct catalyst is of prime importance; a precipitated iron catalyst with 2% in weight of K2C03 produces hydrocarbons containing more than 75% of 1-alkynes; the fluidized bed reactor is well adapted to work with a high carbon monoxide pressure. The extraction of

the elaborated hydrocarbons in the fluidized phase reduces the polymerization process to higher degree alkynes. The optimized combination of pressure, ratio of H2 and C0 pressures, and extraction rate must be calculated. The synthesis of ethylene starting from 1-alkynes seems to be an interesting process.
Author (ESA)

N83-11268# National Bureau of Standards, Washington, D.C. Chemical Thermodynamics Div.
THE 25 GRAM CAPACITY COMBUSTION FLOW CALORIMETER Interim Report, 1 Oct. 1979 - 30 Sep. 1980
E. S. Domalski, K. L. Churney, M. L. Reilly, D. R. Kirklin, A. E. Ledford, and D. D. Thornton Mar. 1982 50 p refs
(Contract EA-77-A-01-6010)
(PB82-200536; NBSIR-82-2457) Avail: NTIS HC A03/MF A01 CSCL 21B

A calorimeter was developed to determine the enthalpies of combustion of kilogram size samples of municipal solid was (MSW) in flowing oxygen near atmospheric pressure. The organic fraction of 25 gram pellets of highly processes MSW was burned in pure oxygen to CO2 and H2O in a small prototype flow calorimeter. The carbon content of the ash and the uncertainty in the amount of CO in the combustion products contribute calorimetric errors of 0.1 percent or less to the enthalpy of combustion. GRA

N83-11269# Illinois Univ., Urbana-Champaign. Advanced Environmental Control Technology Research Center.
EFFECTS OF SURFACE PROPERTIES OF COLLECTORS ON THE REMOVAL OF CHARGED AND UNCHARGED PARTICLES FROM AEROSOL SUSPENSIONS Final Report, Nov. 1980 - Sep. 1981
K. H. Leong, J. J. Stukel, and P. K. Hopke Sep. 1981 70 p refs
(Contract EPA-CR-806809)
(PB82-189663; EPA-600/7-82-006) Avail: NTIS HC A04/MF A01 CSCL 07D

The literature on the adhesion of particles impacting on solid and liquid collectors was reviewed. Different forces or mechanisms affecting collision and adhesion of particles with collectors were described. Good qualitative agreement existed between experiment and theory in the case of solid collectors, although the presence of and variation in surface asperities prevented good quantitative agreement. For liquid collectors, disagreements both theoretical and experimental abounded in the literature on the ability of such collectors to collect non or partially wettable particles. The use of charge on drops in particulate control devices has been shown to greatly enhance the collection of fine particles. However, data indicate that too high a charge may lead to a decrease in efficiencies due to Rayleigh instability of the drops and charge exchange between particles and drops. A program of experimental and modelling studies is proposed to resolve these difficulties in order to be able to optimize control of particulate emissions for fine particles. Author (GRA)

N83-11270# National Bureau of Standards, Boulder, Colo. Thermophysics Properties Div.
THERMAL CONDUCTIVITY OF A POLYURETHANE FOAM FROM 95 K TO 340 K
L. L. Sparks Mar. 1982 23 p refs Sponsored by Gas Research Inst.
(PB82-194150; NBSIR-82-1664) Avail: NTIS HC A02/MF A01 CSCL 07D

Values of thermal conductivity for a 32 kg/cu m, CCl3F blown polyurethane foam are presented in the temperature range from 95 to 340 K. These data were obtained using a guarded hot plate apparatus. The apparent conductivity is discussed in terms of contributions from radiation and solid and gas conduction. Heat transfer via gas convection is not significant when the cell diameters are less than approximately 3 mm; cell dimensions of the thermal conductivity specimen are on the order of 0.5 mm. GRA

N83-11271# Bureau of Mines, Albany, Oreg.
A COMPUTER PROGRAM FOR CALCULATING THERMODYNAMIC PROPERTIES FROM SPECTROSCOPIC DATA
R. P. Beyer Feb. 1982 25 p refs
(PB82-195553; BM-IC-8871) Avail: NTIS HC A02/MF A01 CSCL 07D

A FORTRAN IV computer program was written to calculate thermodynamic properties over a desired temperature range from spectroscopic data. This program computes heat capacities, enthalpies, and entropies for monatomic, diatomic, linear, and nonlinear polyatomic gases. This research is part of an effort to provide thermodynamic data for the advancement of mineral technology. GRA

N83-11272# Moleculon Research Corp., Cambridge, Mass.
DEVELOPMENT OF AN ULTRA-THIN-SKINNED REVERSE OSMOSIS MEMBRANE USING HOMOGENEOUS POROPLASTIC FILM AS THE ULTRAMICROPOROUS SUBSTRATE Final Report
Arthur S. Obermayer, Larry D. Nichols, Marie Baroni Allen, and Robert P. Caron Oct. 1981 39 p refs
(Contract DI-14-34-0001-0437)
(PB82-197906; W82-03947; OWRT-C-00059-S(0437)(1)) Avail: NTIS HC A03/MF A01 CSCL 07D

Moleculon Research Corporation used Poroplastics cellulose triacetate materials for development of reverse osmosis membranes with improved flux at lower pressures. The limiting factor on membranes relying on a thin, osmotically active skin was the inability of large substrate pores to support ultrathin skins. The 15 to 100 Angstroms pore size of Poroplastic substrates offers potential for thinner skins without loss of mechanical integrity. This report describes membrane preparation and testing, and presents performance data together with recommendations for further improvements. The best membranes, obtained by development of thin cellulose triacetate skins directly on Poroplastic substrates through variations in production procedures, provided salt rejection of 97.6% at a flux of 13.2 GFD and a pressure of 800 PSI, comparable with present cellulose diacetate membranes. The higher compaction strength and good chlorine resistance of cellulose triacetate should impart longer lifetime to these new membranes, and further improvements in flux and pressure appear feasible. Author

N83-11273# Manchester Univ. (England).
EXAFS (EXTENDED X-RAY ABSORPTION FINE STRUCTURE) FOR INORGANIC SYSTEMS
C. D. Garner, comp. and S. S. Hasnain, comp. (Science and Engineering Research Council) 1981 147 p refs Proceedings of study weekend held at Daresbury (England), 28-29 Mar. 1981 Sponsored in part by the Royal Society of Chemistry
(PB82-190919; DL/SCI/R-17; ISSN-0144-5677) Avail: NTIS HC A07/MF A01 CSCL 07D

The measurement and interpretation of X-ray absorption spectroscopy, particularly extended X-ray absorption fine structure (EXAFS), is discussed in relation to the improved understanding of a wide range of inorganic systems. The theoretical basis of EXAFS and XANES (X-ray absorption near edge structure), various interpretive approaches, descriptions of the essential experimental details, and several comprehensive illustrations of the successful applications of the technique are considered. GRA

N83-11274# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Chemistry.
HYDROGEN PRODUCTION FROM THERMAL DECOMPOSITION OF WATER (BY SOLAR RADIATION) Technical Report, 1 Jul. 1980 - 31 Jul 1981
H. H. G. Jellinek, Y. Kitamura, H. Kachi, and K. Juznic 31 Oct. 1981 32 p refs
(GRI-5014-363-0172)
Avail: NTIS HC A03/MF A01 CSCL 07D

The development of methodologies and apparatus for the production of hydrogen from the thermal dissociation of water at high temperatures is discussed. Mo-foil was investigated as a possible semipermeable membrane in conjunction with several protective coatings. A thermal gradient approach is described which consists of rapidly quenching the gas mixture to low temperatures

and carrying out the separation of hydrogen at lower temperatures. M.G.

N83-11275# Biospherics, Inc., Rockville, Md.
APPLICATION AND EVALUATION OF ANALYTICAL PROCEDURES FOR TRACE METALS, TOTAL CYANIDES AND PHENOLICS Project Summary Report, Jun. 1979 - Jun. 1980
Gary G. Gottfried 28 Oct. 1982 92 p refs
(Contract EPA-68-03-2788)
(PB82-218512; EPA-600/4-82-001) Avail: NTIS HC A05/MF A01 CSCL 07D

Analytical procedures for the determination of trace metals, total cyanide and phenolics were systematically evaluated for their applicability industry wide. Matrix interferences, methods equivalency, and analytical precision were investigated through a series of duplicate and spiked analyses on nondiluted samples. Validation of the methodologies and identification of their limitations were thus established both within specific industrial classifications and across multiple industrial processes. GRA

N83-11276# Notre Dame Univ., Ind. Radiation Chemistry Data Center.
BIWEEKLY LIST OF PAPERS ON RADIATION CHEMISTRY AND PHOTOCHEMISTRY. ANNUAL CUMULATION WITH KEYWORD AND AUTHOR INDEXES, VOLUME 14, 1981
A. B. Ross 28 Oct. 1982 538 p Sponsored by NBS and DOE
(PB82-214487) Avail: NTIS HC A23/MF A01 CSCL 07D

The annual edited cumulative list of references to the published literature on radiation chemistry, photochemistry, and related fields is given. References are drawn from 60 journals published throughout the world. The list contains the literature references and an author and subject index. GRA

N83-11277# California Univ., Berkeley. Water Thermal and Chemical Technology Center.
ASSESSMENT OF HIGH HEAT-TRANSFER EVAPORATORS AS POWER PLAN CONDENSERS TO PRODUCE ABUNDANT FRESHWATER
Alan D. K. Laird, Joseph Frisch, and Edward F. Ensler 1982 189 p refs
(PB82-198045; OWRT-C-00070-S(0444)(1)) Avail: NTIS HC A09/MF A01 CSCL 07D

Energy requirements to produce abundant freshwater from saline water sources suggests the use of high heat-transfer evaporative condensers in power plants where sufficient waste heat is available for distillation. Review of current existence of such dual-purpose plants as well as a discussion of planning for future designs is presented. Computer programs utilizing available engineering equations and cost analysis for multieffect distillation plants have been developed and are presented with example problems. They are particularly useful for analysis of existing designs, and an additional computer code for optimization of new designs has been developed. The examples show appreciable improvement in lowering unit water cost of the product, as well as adjusting such variables as temperature, mass flow rates and evaporator areas. Preliminary computerized calculations show that a two-effect evaporator unit condensing 7 million pounds per hour of steam from a 1,000 MW power plant would produce 23 million gallons per day of freshwater at a cost of less than $1 per thousand gallons. Author (GRA)

N83-11278# FilmTec Corp., Minnetonka, Minn.
IMPROVED POROUS SUPPORTS FOR THIN-FILM COMPOSITE REVERSE OSMOSIS MEMBRANES Final Report
J. E. Cadotta, R. S. King, J. E. Sand, and R. J. Peterson Nov. 1981 55 p refs
(Contract DI-14-34-0001-0443)
(PB82-197997; W82-03943) Avail: NTIS HC A04/MF A01 CSCL 07D

A study was made on casting of polysulfone support films to eliminate such defects as pinholes and macrovoid or microbead formation. Increasing the density of the support film was the only means found to eliminate these defects. The flux inhibiting effect of increased support density was overcome by the use of additives in the casting solution. The additives included certain hydrophilic polymers, polar aromatic materials and surfactants. Also, a new type of support film was developed from polyacrylonitrile for composite membranes. The polyacrylonitrile support film had advantages over polysulfone in its high degree of solvent resistance. Support films formed from polyacrylonitrile normally shrink and become brittle upon drying. A dry annealing procedure was found that produced a wet-dry stable PAN support film. Author (GRA)

N83-11279# Coury and Associates, Inc., Lakewood, Colo.
A STUDY OF THE MSF DESALINATION PROCESS UTILIZING THE CONTROLLED TWO-PHASE FLOW CONCEPT, PHASE 2 Final Report, 27 Sep. 1978 - 1 Nov. 1981
Michael C. Mickley, Eugene A. Fritzler, and Glenn E. Coury 1 Nov. 1981 51 p refs
(Contract DI-14-34-0001-9525; OWRT Proj. C-90159-D9525-1)
(PB82-198086; W82-04084; OWRTC-90159(9525)(1)) Avail: NTIS HC A04/MF A01 CSCL 07D

A design and cost estimate for a pilot plant using the controlled two phase flow (CTPF) heat transfer concept is presented. Process conceptual design applications and cost estimates are also discussed. The CTPF concept is achieved by introducing a gas into the tubeside of a large condenser bundle, thus inducing a two phase mixture within the condenser tubes. This concept was applied specifically to the multistage flash (MSF) distillation process. The objective of the pilot plant is to enable an extensive analysis and performance evaluation of the two phase flow system under conditions as may be experienced in a CTPF-MSF hybrid plant. The conceptual application studies indicate that a 14% savings in annual amortized capital and electrical energy cost can be achieved using the CTPF concept in an acid treated MSF plant; a 28% savings can be realized using enhanced heat transfer tubes in an acid treated MSF plant; and a 29% savings can be achieved using the CTPF concept and enhanced heat transfer tubes. M.G.

N83-11280# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
FLAME SPREAD OVER SOLID FUELS
Stephen R. Ray Apr. 1982 225 p refs
(Contract NBS-7-320577)
(PB82-206475; NBS-GCR-82-388) Avail: NTIS HC A10/MF A01 CSCL 21B

The flame spread process over solid fuels was investigated using a Laser Doppler Velocimeter to provide two dimensional velocity measurements near the flame and the fuel surface. Thermocouple probes and radiometers were used to develop a more complete picture of the interactions of the fluid flow, heat transfer and species transport near a spreading flame. Flames spread against low opposed flows and/or high oxygen concentrations are controlled by heat transfer effects. At higher opposed flows and/or lower oxygen concentrations, gas phase chemistry effects begin to dominate. It is believed that the fuel is vaporized behind the flame front, followed by diffusion upstream within the quench layer next to the fuel surface. The process results in a decrease in flame spread rate with opposed flow velocity and leads eventually to extinction. A correlation of a wide range of flame spread results is presented based on two dimensionless parameters: a Damkohler number which addressed the gas phase phenomena and a dimensionless spread rate which incorporated the heat transfer effects. The correlation was successful for both thermally thick and thin fuels. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-11281# Aeronautical Research Labs., Melbourne (Australia).
THE INFLUENCE OF WATER-DISPLACING ORGANIC CORRO-

SION INHIBITORS ON THE FATIGUE BEHAVIOUR OF 2024-T3 ALCALD ALUMINIUM ALLOY BOLTED JOINTS
A. S. Machin and J. Y. Mann Jan. 1982 37 p refs
(ARL-Struc-Report-390; AR-002-335) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out in repeated tension under both constant amplitude and multiload level sequences on several types of 8 bolt double lap joint specimens of 2024-T3 alcald aluminum alloy sheet. These included both low and high (100%) load transfer joints, using high and low bolt clamping forces in each case. Complementary tests were made on each type of joint assembled with either dry components or components coated with the corrosion inhibitor preparations LPS-3 or PX-112. Contrary to the findings of previous investigations into the effect of inhibitors on riveted joints, the two corrosion inhibitors used were found, in general, to have either no effect or a beneficial effect on the fatigue lives of bolted joints. It is concluded that the specific effects of a water displacing organic corrosion inhibitor on fatigue strength of joints are likely to be dependent on both the type of joint, its configuration and on the severity of the load spectrum involved. B.W.

N83-11282*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COSAM (CONSERVATION OF STRATEGIC AEROSPACE MATERIALS) PROGRAM OVERVIEW
Washington Oct. 1982 227 p Workshop held at Cleveland, 14-15 Oct. 1982
(NASA-TM-83006; E-1382; NAS 1.15:83006) Avail: NTIS HC A11/MF A01 CSCL 11F

Abstracts and visual materials used to illustrate presentations reviewing progress in the Conservation of Strategic Materials Program (COSAM) are presented. For individual titles, see N83-11283 through N83-11308.

N83-11283*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COSAM PROGRAM OVERVIEW
Joseph R. Stephens *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 1-11 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The COSAM program for reduction of the use of strategic alloying elements in nickel-based superalloys for gas turbine engines was reviewed. Sources, consumption, and pricing of cobalt, tantalum, columbium, and chromium are surveyed. Research projects in strategic element substitution, advanced processing concepts, and the development of alternate materials (intermetallics and iron-base alloys) are listed and research plans for FY 1983 and FY 1984 summarized. J.D.

N83-11284*# Columbia Univ., New York.
SUPERALLOY COMPOSITION MODELING
Jeffrey Barefoot, Robert Jarrett, Juan Sanchez, and John Tien *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 13-19 (For primary document see N83-11282 02-26)
(Grant NAG3-57)
Avail: NTIS HC A11/MF A01 CSCL 11F

Development of a predictive method for determination of the gamma/gamma prime phase fields, i.e., gamma prime volume fraction as a function of the multicomponent composition, is described. The cluster variation method used for binary alloys in which the precipitated phase is coherent with the matrix phase is extended for application to the multicomponent coherent gamma/gamma prime nickel-based superalloys. It is shown that the cluster variation method can accurately describe the equilibrium (incoherent) gamma/gamma prime phase fields in the binary Ni-Al phase diagram. The gamma/gamma prime phase field for the Ni-Cr-Al ternary phase diagram is computed as a function of temperature. A reasonable fit results between the calculated and the experimental diagrams. The modeling of the six-component Ni-Cr-Al-Co-Mo-Ti base superalloy and the effect of Ni substitution of Co are discussed. J.D.

N83-11285*# Special Metals Corp., New Hartford, N.Y.
PREPARATION OF LOW STRATEGIC METAL CONTENT SUPERALLOYS
F. E. Sczerzenie and G. E. Maurer *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 21-35 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The properties of modified NIMONIC 115 and UDIMET 720 with reduced levels of cobalt were evaluated. Vacuum induction melted and vacuum arc remelted ingots were hot rolled to 3/4 inch diameter bar. Hot workability was evaluated in terms of the ingot rolling behavior and the hot ductility of the as-rolled bar. Variations in workability and bar ductility were correlated to variations in incipient melting temperature and gamma prime solvus, both of which varied with cobalt content. Heat treatments were defined to yield, as far as possible, similar structures from alloy to alloy. At the lowest cobalt levels N-115 workability was severely limited and the alloys could not be worked to bar. It is suggested that incipient melting in combination with heavy grain boundary carbide precipitation reduced ingot workability. Final heat treatment of modified alloys was difficult in the situation where the gamma prime solvus temperature was close to the incipient melting point, indicating that it may not be feasible to fully solution low cobalt alloys to obtain the large grain size required for optimum creep resistance. J.D.

N83-11286*# Columbia Univ., New York.
ROLE OF COBALT IN NICKEL BASE SUPERALLOYS
Robert Jarrett, Jeffrey Barefoot, John Tien, and Juan Sanchez *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 37-62 (For primary document see N83-11282 02-26)
(Grant NAG3-57)
Avail: NTIS HC A11/MF A01 CSCL 11F

The effect of cobalt or substituting for cobalt on the mechanical properties of nickel-based superalloys is discussed. Waspaloy, UDIMET 700, and NIMONIC 115, which are representative of Ni-Cr-Co-Al-Ti-Mo superalloys having different gamma prime contents which are strengthened by a heavily alloyed matrix, coherent gamma prime precipitates, and carbides at the grain boundaries. Microstructure and in situ and extracted phase STEM micro-analysis were used to evaluate the three alloys. J.D.

N83-11287*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF REDUCED COBALT CONTENTS ON HOT ISOSTATICALLY PRESSED POWDER METALLURGY U-700 ALLOYS
Fredric H. Harf *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 63-70 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The effect of reducing the cobalt content of prealloyed powders of UDIMET 700 (U-700) alloys to 12.7, 8.6, 4.3, and 0% was examined. The powders were hot isostatically pressed into billets, which were given heat treatments appropriate for turbine disks, namely partial solutioning at temperatures below the gamma prime solvus and four step aging treatments. Chemical analyses, metallographic examinations, and X-ray diffraction measurements were performed on the materials. Minor effects on gamma prime content and on room temperature and 650 C tensile properties were observed. Creep rupture lives at 650 C reached a maximum at the 8.4% concentration, while at 760 C a maximum in life was reached at the 4.3% cobalt level. Minimum creep rates increased with decreasing cobalt content at both test temperatures. Extended exposures at 760 and 815 C resulted in decreased tensile strengths and rupture lives for all alloys. Evidence of sigma phase formation was also found. J.D.

N83-11288*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW-COBALT SINGLE CRYSTAL RENE 150
Coulson M. Scheuermann *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 71-76 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The effects of cobalt content on a single crystal version of the advanced, high gamma prime content turbine airfoil alloy Rene 150 were investigated. Cobalt contents under investigation include 12 wt.% (composition level of Rene 150), 6 wt.%, and 0 wt.%. Preliminary test results are presented and compared with the properties of standard DS Rene 150. DTA results indicate that the liquidus goes through a maximum of about 1435 C near 6 wt.% Co. The solidus remains essentially constant at 1390 C with decreasing Co content. The gamma prime solvus appears to go through a minimum of about 1235 C near 6 wt.% Co content. Preliminary as-cast tensile and stress rupture results are presented along with heat treat schedules and future test plans. Author

N83-11289*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL FATIGUE RESISTANCE OF COBALT-MODIFIED UDIMET 700
Peter T. Bizon *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 77-81 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The determination of comparative thermal fatigue resistances of five cobalt composition modifications of UDIMET 700 from fluidized bed tests is described. Cobalt compositional levels of < 0.1, 4.3, 8.6, 12.8, 17.0 percent were being investigated in both the bare and coated (NiCrAlY overlay) conditions. Triplicate tests of each variation including duplicate tests of three control alloys are under investigation. Fluidized beds were maintained at 550 and 1850 F for the first 5500 cycles at which time the hot bed was increased to 1922 F. Immersion time in each bed is always 3 minutes. Upon the completion of 10,000 cycles, it appears that the 8.6 percent cobalt level gives the best thermal fatigue life. Considerable deformation of the test bars was observed. Author

N83-11290*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CREEP-FATIGUE OF LOW COBALT SUPERALLOYS
Gary R. Halford *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 83-88 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Testing for the low cycle fatigue and creep fatigue resistance of superalloys containing reduced amounts of cobalt is described. The test matrix employed involves a single high temperature appropriate for each alloy. A single total strain range, again appropriate to each alloy, is used in conducting strain controlled, low cycle, creep fatigue tests. The total strain range is based upon the level of straining that results in about 10,000 cycles to failure in a high frequency (0.5 Hz) continuous strain-cycling fatigue test. No creep is expected to occur in such a test. To bracket the influence of creep on the cyclic strain resistance, strain hold time tests with ore minute hold periods are introduced. One test per composition is conducted with the hold period in tension only, one in compression only, and one in both tension and compression. The test temperatures, alloys, and their cobalt compositions that are under study are given. J.D.

N83-11291*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OXIDATION OF LOW COBALT ALLOYS
Charles A. Barrett *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 89-94 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Four high temperature alloys: U-700, Mar M-247, Waspaloy and PM/HIP U-700 were modified with various cobalt levels ranging from 0 percent to their nominal commercial levels. The alloys were then tested in cyclic oxidation in static air at temperatures ranging from 1000 to 1150 C at times from 500 to 100 1 hour cycles. Specific weight change with time and X-ray diffraction analyses of the oxidized samples were used to evaluate the alloys. The alloys tend to be either Al2O3/aluminate spinel or Cr2O3/chromite spinel formers depending on the Cr/Al ratio in the alloy. Waspaloy with a ratio of 15:1 is a strong Cr2O3 former while this U-700 with a ratio of 3.33:1 tends to form mostly Cr2O3 while Mar M-247 with a ratio of 1.53:1 is a strong Al2O3 former. The best cyclic oxidation resistance is associated with the Al2O3 formers. The cobalt levels appear to have little effect on the oxidation resistance of the Al2O3/aluminate spinel formers while any tendency to form Cr2O3 is accelerated with increased cobalt levels and leads to increased oxidation attack. S.L.

N83-11292*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HOT CORROSION OF LOW COBALT ALLOYS
Carl A. Stearns *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 95-106 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The hot corrosion attack susceptibility of various alloys as a function of strategic materials content are investigated. Preliminary results were obtained for two commercial alloys, UDIMET 700 and Mar-M 247, that were modified by varying the cobalt content. For both alloys the cobalt content was reduced in steps to zero. Nickel content was increased accordingly to make up for the reduced cobalt but all other constituents were held constant. Wedge bar test samples were produced by casting. The hot corrosion test consisted of cyclically exposing samples to the high velocity flow of combustion products from an air-fuel burner fueled with jet A-1 and seeded with a sodium chloride aqueous solution. The flow velocity was Mach 0.5 and the sodium level was maintained at 0.5 ppm in terms of fuel plus air. The test cycle consisted of holding the test samples at 900 C for 1 hour followed by 3 minutes in which the sample could cool to room temperature in an ambient temperature air stream. S.L.

N83-11293*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INFLUENCE OF COBALT, TANTALUM, AND TUNGSTEN ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF SUPERALLOY SINGLE CRYSTALS
Michael V. Nathal and L. J. Ebert (Case Western Reserve Univ.) *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 107-116 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The influence of Co, Ta, and W on the microstructure and mechanical properties of nickel base super-alloy single crystals was investigated. A matrix of alloys was based on Mar-M 247 stripped of C, B, Zr, and Hf. The microstructures of the alloys were examined using optical and electron microscopy, phase extraction, X-ray diffraction, and differential thermal analysis. Tensile and creep-rupture tests were performed at 1000 C. An increase in tensile and creep strength resulted when Co was removed from alloys containing high refractory metal contents, but Co effects were negligible for alloys with lower refractory metal levels. In the composition range studied, W was more effective than Ta in increasing the creep resistance. The mechanical properties are discussed in relation to the microstructures of the alloys. S.L.

N83-11294*# Michigan Technological Univ., Houghton.
STRUCTURE-PROPERTY EFFECTS OF TANTALUM ADDITIONS TO NICKEL-BASE SUPERALLOYS
R. W. Heckel, B. J. Pletka, D. A. Koss, and M. R. Jackson (GE, Schenectady, N.Y.) *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 117-123 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The characterization of the effect of Ta on the structure of Ni base superalloys, the determination of the effects of Ta (structure) variations on the mechanical, thermal, and oxidation behavior, and the identification of alloying elements which have potential as substitutes for Ta are investigated. Mar M247 type alloys are emphasized; nominal and analyzed compositions of ten alloys under study are given. X-ray and composition analysis are being used to determine the partitioning of alloying elements between gamma, gamma primes, and MC (cubic) as a function of Ta content. The diffusional interactions of the Mar M247-type alloys with as cast beta + gamma alloys are studied to determine the effects of Ta on alloy/coating degradation. S.L.

N83-11295*# TRW, Inc., Cleveland, Ohio.
MECHANICAL PROPERTIES OF LOW TANTALUM ALLOYS
C. S. Kortovich *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 125-131 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The mechanical property behavior of equiaxed cast B-1900 + Hf alloy as a function of tantalum content was studied. Tensile and stress rupture characterization was conducted on cast to size test bars containing tantalum at the 4.3% (standard level), 2.2% and 0% levels. Casting parameters were selected to duplicate conditions used to prepare test specimens for master metal heat qualification. The mechanical property results as well as results of microstructural/phase analysis of failed test bars are presented. S.L.

N83-11296*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
EFFECT OF REDUCTION OF STRATEGIC COLUMBIUM ADDITIONS IN INCONEL 718 ALLOY ON THE STRUCTURE AND PROPERTIES
Karl Ziegler and John F. Wallace *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 133-140 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The amount of columbium which can be removed from Inconel alloy 718 without degrading its high temperature properties was determined. The elements that are substituted are: vanadium and tungsten together and separately; increasing the molybdenum level from 3.0% to 5.8% and increasing the boron to 0.04%. S.L.

N83-11297*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DUAL ALLOY INTERFACE STABILITY
Fredric H. Harf *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 141-152 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Powder metallurgy dual alloy fabrication is applied to combinations of superalloys having a high iron, and low strategic metal content, with standard nickel base superalloys, containing the strategic metals chromium, cobalt, and columbium. The possibility of combining Alloy 901 (12 percent Cr, 36 percent Fe, 0 percent Co, and 0 percent Cb) with turbine disk alloys Rene 95 (13 percent Cr, 8 percent Co, and 4 percent Cb) or low carbon astroloy (L.C.A.; 15 percent Cr, 17 percent Co, and 0 percent Cb) is investigated. Preliminary results for combinations show that a strong interface with rapid diffusion is obtained between alloys and that the standard heat treatments for either alloy may be satisfactory. S.L.

N83-11298*# Illinois Univ., Urbana-Champaign.
REDUCTION OF CHROMIUM IN NI-BASE SUPERALLOYS THROUGH ELEMENT SUBSTITUTION AND RAPID SOLIDIFICATION PROCESSING
H. D. Fraser and B. C. Muddl *In* NASA. Lewis Research Center COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 153-156 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The reduction in the use of Cr in Ni base superalloys by the combined approaches of both elemental substitution and rapid solidification processing is studied. The elements Si, Zr, Y and Hf were chosen as potential partial substitutes for Cr in Waspaloy and IN 713LC sine their separate addition to other alloys has previously resulted in enhanced oxidation resistance. The roles of Cr and these replacement elements in determining the microstructure and properties are evaluated. The elements Si, Zr, and Y and Hf are used as partial replacements for Cr in the base superalloys and these resultant alloys are processed using rapid solidification techniques. The mechanical properties and oxidation resistance of the processed materials are evaluated. The microstructure is characterized using state of the art techniques (e.g. analytical transmission electron microscopy), and the mechanism by which these structures are produced is determined. S.L.

N83-11299*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECTS ON STRESS RUPTURE LIFE AND TENSILE STRENGTH OF TIN ADDITIONS TO INCONEL 718
Robert L. Dreshfield and Walter Johnson (Special Metals Corp.) *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 157-160 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Because Inconel 718 represents a major use of columbium and a large potential source of columbium for aerospace alloys could be that of columbium derived from tin slags, the effects of tin additions to Inconel 718 at levels which might be typical of or exceed those anticipated if tin slag derived columbium were used as a melting stock were investigated. Tin was added to 15 pound Inconel 718 heats at levels varying from none added to approximately 10,000 ppm (1 wt%). Limited 1200 F stress rupture testing was performed at stresses from 68,000 to 115,000 psi and a few tensile tests were performed at room temperature, 800 and 1200 F. Additions of tin in excess of 800 ppm were detrimental to ductility and stress rupture life. S.L.

N83-11300*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTERMETALLICS AS ALTERNATIVE MATERIALS
J. Daniel Whittenberger *In its* COSAM (Conserv. Of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 163-174 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Aluminum containing intermetallics have B2 cubic crystal structures, exist over a wide range of composition, have large solubilities for third element alloying additions, are capable of both low and high temperature plastic flow, and have very high melting temperatures (approximately 1900 K) except for FeAl. The slow strain rate elevated temperature properties of Fe, Ni, and Co aluminides are investigated. Because of the reported difficulties with traditional melting/casting methods, sound polycrystalling materials are fabricated by hot extrusion of steel canned blended prealloyed powders. These binary aluminides are used to develop base line elevated temperature mechanical properties as well as an understanding of the factors which affect/control the strength and ductility. S.L.

N83-11301*# Dartmouth Coll., Hanover, N.H. School of Engineering.
THE STRENGTH AND DUCTILITY OF POLYCRYSTALLINE NiAl IN TENSION
E. M. Schulson *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 175-182 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Experiments at temperatures from 20 C to 400 C at two strain rates (.0001/s and .000005/s) establish that: (1) at room temperatures, binary and microalloyed (< 1000 ppm La, Y, Mo, Ti) NiAl shows negligible ductility, independent of grain size over the range 5 to 140 micrometers; (2) at 295 C the tensile elongation of binary 51 Ni/49 Al increases from < 1% to about 5% upon decreasing

the grain size to below approximately 10 micrometers; (3) similarly, at 400 C the ductility increases from about 2% to 15% upon decreasing the grain size to below 15 micrometers; (4) the ductility of fine grained (7 micrometer) binary aggregates deformed at 295 C increases from approximately 5% to 12% upon decreasing the strain rate from .0001/s to .000005/s; (5) partial recrystallization (10% to 20%) of warm extruded binary and microalloyed material imparts 1% to 2% ductility at room temperature where fully recrystallized material is brittle; (6) the yield strength obeys a Hall-Petch relationship; and (7) when ductility is not observed, fracture coincides with yielding. The mechanisms underlying the flow and fracture of NiAl are discussed in terms of the nucleation and growth of microcracks. The concept of a critical grain size is considered in the light of the results. A.R.H.

N83-11302*# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
HIGH TEMPERATURE DEFORMATION OF NiAl AND CoAl
W. D. Nix *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 183-190 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The high temperature mechanical properties of the aluminides are reviewed with respect to their potential as high temperature structural materials. It is shown that NiAl and CoAl are substantially stronger than the pure metals Ni and Co at high temperatures and approach the strength of some superalloys, particularly when those superalloys are tested in 'weak' directions. The factors that limit and control the high temperature strengths of NiAl and CoAl are examined to provide a basis for the development of intermetallic alloys of this type. Author

N83-11303*# Texas A&M Univ., College Station. Dept. of Mechanical Engineering.
THE USE OF THE PUCOT FOR ELASTIC MODULUS MEASUREMENTS ON INTERMETALLICS AT HIGH TEMPERATURES
Alan Wolfenden *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 191-196 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The piezoelectric ultrasonic composite oscillator technique (PUCOT) is being applied to measure the elastic constants of the aluminides in the temperature ranges 300 to 1700 K (CoAl and NiAl) and 300 to 1500 K (FeAl). The PUCOT consists of piezoelectric quartz drive and gauge crystals to excite longitudinal or torsional ultrasonic (80 kHz) resonant stress waves in the specimen and alumina spacer rod of appropriate resonant lengths. The resonant system is driven by a closed loop oscillator which maintains a constant gauge voltage and hence constant strain amplitude in the specimen. While the specimen is heated at 20 K/h the resonant period is measured continuously. The elastic moduli are calculated from these values of the resonant period and accurate determinations of specimen length. The technique is described and some results given. A.R.H.

N83-11304*# Connecticut Univ., Storrs.
EUTECTIC EQUILIBRIA IN THE QUATERNARY SYSTEM Fe-Cr-Mn-C
H. Nowotny, S. Wayne, and J. C. Schuster (Vienna Univ.) *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 199-202 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

The constitution of the quaternary system, Fe-Cr-Mn-C and to a lesser extent of the quinary system, Fe-Cr-Mn-Al-C were examined for in situ composite alloy candidates. Multivariant eutectic compositions were determined from phase equilibria studies wherein M7C3 carbides (approximately 30% by volume) formed from the melt within gamma iron. An extended field of the hexagonal carbide, (Cr, Fe, Mn)7 C3, was found without undergoing transformation to the orthorhombic structure. Increasing stability for this carbide was found for higher ratios of Cr/Fe(+) Cr + Mn. Aluminum additions promoted a ferritic matrix while manganese favored the desired gamma austenitic matrix. In coexistence with the matrix phase, chromium enters preferentially the carbide phase while manganese distributes equally between the gamma matrix and the M7C3 carbide. The composition and lattice parameters of the carbide and matrix phases were determined to establish their respective stabilities. A.R.H.

N83-11305*# United Technologies Research Center, East Hartford, Conn.
ELEVATED TEMPERATURE PROPERTIES OF ALIGNED FERROUS EUTECTICS
Franklin D. Lemkey *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 203-208 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Iron base alloys containing aluminum and chromium together with smaller amounts of yttrium and silicon are of interest for high temperature applications. Strengthening an inherently weak but oxidation resistant solid solution matrix with aligned in situ chromium carbides represents an attractive approach to achieving both surface stability and creep resistance at elevated temperatures. Aligned microstructures were produced in alloys of approximately 30 wt % (Cr + Mn), about 3 wt % C and the balance Fe consisting of a gamma matrix and the hexagonal carbide (Cr, Mn, Fe)7C3. The tensile and stress rupture strength to 2000 F of aligned Fe-20 w/t % Cr-10 wt % Mn-3.2 wt % C measured parallel to the carbide reinforcement exceeded those of the strongest iron-nickel superalloys, e.g., CRM-6D developed by Chrysler for automotive turbine application. The cyclic oxidation and sulfidation response of these alloys at elevated temperatures can be markedly improved by aluminum additions. Author

N83-11306*# United Technologies Research Center, East Hartford, Conn.
DEVELOPMENT OF CAST FERROUS ALLOYS FOR STIRLING ENGINE APPLICATION
Franklin D. Lemkey *In* NASA. Lewis Research Center COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 209-214 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Low cost cast ferrous base alloys that can be used for cylinder and regenerator housing components of the Stirling engine were investigated. The alloys must meet the requirements of high strength and thermal fatigue resistance to approximately 1500 F, compatibility and low permeability with hydrogen, good elevated temperature oxidation/corrosion resistance, and contain a minimum of strategic elements. The phase constituents of over twenty alloy iterations were examined by X-ray diffraction. These alloy candidates were further screened for their tensile and stress rupture strength and surface stability in air at 1450 and 1600 F, respectively. Two alloys, NASAUT 1G (Fe-10Mn-20Cr-1.5C-1.0Si) and NASAUT 4G (Fe-15Mn-12Cr-3Mo-1.5C-1.0Si-1.0Nb), were chosen for more extensive elevated temperature testing. These alloys were found to exhibit nearly equivalent elevated temperature creep strength and oxidation resistance. Silicon present in these alloys at the 1 w/o level permitted the achievement of oxide scale adherence to 1600 F without loss of strength (or ductility) as was noted for equivalent additions of aluminum. J.M.S.

N83-11307*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEVELOPMENT OF Fe-Mn-Al-X-C ALLOYS
Susan R. Schuon *In its* COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 217-223 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Development of a low cost Cr-free, iron-base alloy for aerospace applications involves both element substitution and enhancement of microstructural strengthening. When Mn is substituted for Ni and Al or Si is substituted for Cr, large changes occur in the mechanical and thermal stability of austenite in FeMnAlC alloys. The in situ strength of MC or M2C (M = Ti, V, Hf, Ta, or Mo) in FeMnAlC alloys was determined. The high temperature tensile

strength depends more on the distribution of carbides than the carbide composition. Precipitation of a high volume percent-ordered phase was achieved in Fe2OMnIONi6Al6Ti (IC) alloys. As case, these alloys have a homogeneous austenitic structure. After solutioning at 1100 C for 5 hr followed by aging at 600 C for 16 hr, gamma prime or a perovskite carbide is precipitated. Overaging occurs at 900 C where eta is precipitated. J.M.S.

N83-11308*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SiC OR B4C-B/LOW STRATEGIC ELEMENT CONTENT COMPOSITE
Donald W. Petrasek *In its* COSAM (Conserv. of Strategic Aerospace Mater.) Program Overview Oct. 1982 p 225-230 (For primary document see N83-11282 02-26)
Avail: NTIS HC A11/MF A01 CSCL 11F

Advancements in materials technologies are needed to provide the aerospace industry with alternate material options in the event of future strategic metal shortages and to optimize performance of engines. Composite materials are promising candidates for such an application. The potential of SiC and B4C-B filament reinforced low strategic element iron-base alloy content composites or use at 760 to 870 C is considered. A limiting factor towards developing this material for high temperature use has been the reaction between the filament and matrix material during fabrication and service which degrades filament strength. A low temperature fabrication process to limit filament/matrix reaction is being developed which involves the use of hollow cathode sputtering to coat the filaments with iron-base alloys of various compositions. An investigation is being conducted to determine the interfacial reaction effects of SiC and B4C-B filaments with iron-base alloys to develop an understanding of filament/matrix alloy compatibility for 760 to 870 C service. Author

N83-11309*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MICROSTRUCTURAL BEHAVIOR OF INTERFACES IN HOT ISOSTATICALLY PRESSED, DUAL ALLOY COMBINATIONS
Fredric H. Harf Sep. 1981 11 p refs
(NASA-TM-82698; E-981; NAS 1.15:82698) Avail: NTIS HC A02/MF A01 CSCL 11F

Combinations of the nickel-base superalloys MERL 76 and low carbon Astroloy, Rene 95 and low carbon Astroloy, Rene 95 and NASA-TRW-VIA were consolidated from prealloyed powders by hot isostatic pressing. These combinations were exposed to 870 C for 1500 hours, and in a gradient furnance to temperatures up to incipient melting and subjected to microstructural examinations. The only phases found at the interfaces were those which were also present in the component alloys. Author

N83-11310*# Mississippi State Univ., Mississippi State. Dept. of Electrical Engineering.
POST HEAT TREATMENT EFFECTS ON DOUBLE LAYER METAL STRUCTURES FOR VLSI APPLICATIONS
Thomas E. Wade and J. D. Trotter Nov. 1978 31 p refs
(Contract NAS8-26749)
(NASA-CR-161168; NAS 1.26:161168; MSSU-EIRS-EE-79-2) Avail: NTIS HC A03/MF A01 CSCL 11F

The realization of high yield double layer metal systems using wet chemistry processes and the ability to extend yields beyond that attainable with wet chemistry by means of post sintering processes at temperatures below 500 C for potential applications in very large scale integration structures were studied. Yields in excess of 98% and average total contact resistance of less than 150 ohms and 200 ohms were realized for a series of 560 vias of 0.5 X 0.5 mils and 0.2 X 0.2 mils in size, respectively. R.J.F.

N83-11311# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
THE SLIDING BEHAVIORS OF COPPER ALLOYS Final Report
R. S. Montgomery Jun. 1982 41 p refs Presented at the Gordon Conf., New London, N.H., 14-18 Jun. 1982
(DA Proj. 1L1-61102-AH-60)
(AD-A118379; AD-E440158; ARCLB-TR-82018) Avail: NTIS HC A03/MF A01 CSCL 11/6

The unlubricated behaviors of a number of copper alloys and especially their metal transfers and scuffing tendencies were investigated on steel, chromium electroplate, and tantalum using a specially designed pin-on-disk friction and wear machine. This machine limited the sliding time to about 100 msec. It was not possible to correl .te metal transfer, scuffing (rough deposits), or friction with the properties of the alloys. There was a correlation of wear with hardness for similar alloys with higher hardness alloys having lower wear. The effect of hardness was different for different mating surfaces. The data from aluminum bronze and the welded overlay rotating band materials investigated did not fall into this correlation. This could not be attributed to a special microstructure or to crystalline orientation in the case of the welded overlay band materials. Mutual solubility of the pin and disk metals and relative position in the periodic table also did not control metal transfer and scuffing with the copper alloys investigated. While position in the periodic table is identical and mutual solubilities are certainly very similar for most of the copper alloys, there were great differences in metal transfer and scuffing. While there was a tendency for more transfer to occur at higher wear rates, heavy and very heavy transfer do occur even at very low rates. Heavy and very heavy transfer were not usually associated with high wear and rough deposits were not usually associated with high wear and heavy transfer. The first step in wear was not transfer to the mating surfaces. In addition, small amounts of iron in the copper alloys did not result in scuffing and high metal transfer even when sliding on steel. GRA

N83-11312# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
AN ANALYTICAL MODEL FOR RF INDUCTIVE GLOW DISCHARGE COLUMNS IN METAL-GAS MIXTURES AND APPLICATION TO THE Rb-Xe SYSTEM
Hans U. Eckert 12 Jul. 1982 42 p refs
(Contract F04701-81-C-0082)
(AD-A118346; TR-0082(2472-06)-1; SD-TR-82-47) Avail: NTIS HC A03/MF A01 CSCL 11/6

The electron balance equation is solved for a glow discharge column excited by RF induction in a metal vapor - noble gas mixture where the metal atoms are ionized in a single step and ionization of the gas is negligible. The accumulation of metal atoms near the wall is accounted for by postulating for their radial distribution n(r), a power law with positive exponent. Under this condition, the profile for the electron density ne(r) can be expressed by zero order Bessel functions containing a profile parameter q that is related to the exponent in the atomic distribution n(r), q is evaluated as a function of RF power input and electron temperature Te for a fixed column radius R = 0.4 cm by solving the electron energy balance equation for Te does not equal f(r). GRA

N83-11313# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
A COMPARISON OF MICROSTRUCTURE AND PROPERTIES OF EQUIVALENT STRENGTH INGOT METALLURGY AND POWDER METALLURGY 7XXX ALUMINUM ALLOYS Final Report, Aug. 1979 - Sep. 1980
Stephen H. Doerr Aug. 1981 183 p refs
(AF Proj. 2418)
(AD-A118280; AFWAL-TR-81-4068) Avail: NTIS HC A09/MF A01 CSCL 11/6

Microstructure and property relationships of equivalent strength ingot and powder metallurgy (I/M and P/M) 7XXX aluminum alloy die forgings were examined. Fatigue, toughness and corrosion behavior are discussed. Unlike the I/M product, the P/M material did not exhibit a reduction in S-N fatigue behavior in the transverse orientation. Since toughness anisotropy is not similarly dependent upon check initiation variables, no such anomaly occurred in this property. P/M material was more resistant to exfoliation corrosion in any condition of heat treatment than the most resistant heat treatment condition of the I/M material. GRA

N83-11314# Naval Research Lab., Washington, D. C.
EVALUATION OF IAEA COORDINATED PROGRAM STEELS AND WELDS FOR 288 DEG C RADIATION EMBRITTLEMENT RESISTANCE
J. R. Hawthorne Feb. 1982 47 p refs
(Contract NRC-FIN-B-5528)
(AD-A117974; NRL-MR-4655; NUREG-CR-2487) Avail: NTIS MF A01; SOD HC $3.00 CSCL 11/6

Eight steel materials supplied by the Federal Republic of Germany, France and Japan to the International Atomic Energy Agency (IAEA) Program on 'Analysis of the Behavior of Advanced Reactor Pressure Vessel Steels Under Neutron Irradiation' were irradiated at 288 C for assessments of relative notch ductility and dynamic fracture toughness change with approximately 2 x 10 to the 19th power n/cm squared, E > 1 MeV. Notch ductility and fracture toughness were determined, respectively, by Charpy-V and fatigue precracked Charpy-V test methods. An A533-B steel plate (HSST 03) produced in the USA was included in the irradiation test series for reference. The materials (plate, weld, forging) were found to be generally more resistant to radiation-induced embrittlement than the reference material. Observed dissimilarities in radiation sensitivity are attributed to copper content differences between the eight materials (0.01 to 0.07 percent copper range) and the reference plate (0.12 percent copper). Radiation resistances, however, correspond well with the trend of radiation resistance reported for USA-produced steels and welds having similar copper and phosphorus contents. A general correlation of transition temperature elevations measured independently by the Charpy-V and the precracked Charpy-V test methods was observed. Author (GRA)

N83-11315# Naval Research Lab., Washington, D. C.
STATUS OF KNOWLEDGE OF RADIATION EMBRITTLEMENT IN USA REACTOR PRESSURE VESSEL STEELS
J. R. Hawthorne Feb. 1982 38 p refs
(Contract NRC-FIN-B5528)
(AD-A117973; NRL-MR-4737; NUREG-CR-2511) Avail: NTIS HC A03/MF A01 CSCL 11/6

Advances by experimental research in the USA toward an improved understanding of property changes in steel by elevated temperature (approximately 288 deg C) irradiation are summarized. Four areas of investigation are reviewed including the confirmation and demonstration of guidelines for radiation resistant steels, the isolation of metallurgical factors contributing to variable radiation embrittlement sensitivity, the qualification of in situ heat treatments for periodic vessel embrittlement relief, and the correlation of notch ductility and fracture toughness changes with irradiation. Overall, the current state of the art provides both a high capability for tailoring steels for radiation service in new vessel construction and a promising method for controlling radiation embrittlement buildup in existing vessel construction. Author (GRA)

N83-11316# Wiggin Alloys Ltd., Hereford (England).
DEVELOPMENT OF A BRAZING ALLOY FOR THE MECHANICALLY ALLOYED HIGH TEMPERATURE SHEET MATERIAL INCOLOY ALLOY MA 956 Final Report, 1 Dec. 1978 - 31 Mar. 1981
W. E. Morgan and P. J. Bridges Wright-Patterson AFB, Ohio AFWAL Sep. 1981 98 p refs
(Contract F49620-79-C-0008)
(AD-A118252; TR-3381; AFWAL-TR-81-4093) Avail: NTIS HC A05/MF A01 CSCL 11/6

This report describes trials on a range of potential brazing alloys for use on the mechanically alloyed high temperature ODS material INCOLOY MA 956 at temperatures up to 1200 C. Brazing properties were assessed on an initial 60 compositions chosen on the basis of melting point and substrate compatibility, from the Ni-Cr-Pd, Fe-Cr-Pd, Ni-Cr-Ge, Fe-Cr-Ge, Fe-Cr-B, and Fe-Cr-Si ternary systems. The only one of these which proved to be satisfactory in terms of brazing characteristics, oxidation resistance and strength at 1100 C was the Ni-Cr-Pd system. GRA

N83-11317# Martin Marietta Aerospace, Orlando, Fla.
APPLICATION OF POWDERED METAL TECHNOLOGY TO PRODUCE TITANIUM GYRO PARTS. VOLUME 1: OVERALL TEST RESULTS
Ronald J. Regn Mar. 1982 49 p
(Contract DAAK10-78-C-0070)
(AD-A118064; OR-16766-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 11/6

Components and test specimens produced by the powder metallurgy process have been demonstrated to possess approximately 94 percent the strength of components and specimens 'hogged out' from wrought bar stock. The design of the components, made from either P/M or wrought stock, has a safety factor sufficient to alleviate concerns about the minor strength differences between the two processes. The large quantity of specimens evaluated had little variation in the data spread so that there exists a high confidence that the mechanical property values listed herein are accurate. Designers of followon programs can use these values. The strength evaluations on components and specimens were believed to have been sufficient to justify P/M from a stress standpoint. The testing of gyros for function and parameter stability should satisfy concerns about part contact, interface, and operation. Minor parametric differences in pre/post environment exposure are attributed to handling errors by contributors outside the normal manufacturing realm whose influences are not controlled by approved procedures. From a cost standpoint, the use of an approved alternate P/M process to fabricate gyro components will be a function of an ever-changing economic condition of the metals industry. Easy availability of wrought stock and scrappage losses from hog-out machining must be weighed against the costs of P/M preform processing. In a condition of urgency, the P/M alternative could prove invaluable. GRA

N83-11318# Sandia Labs., Albuquerque, N. Mex. Materials Science Div.
SOLIDIFICATION AND SOLID STATE TRANSFORMATIONS OF AUSTENITIC STAINLESS STEEL WELDS
J. A. Brooks, J. C. Williams, and A. W. Thompson May 1982 28 p refs Prepared in cooperation with Carnegie-Mellon Univ.
(Contract DE-AC04-76DP-00789)
(DE82-015081; SAND-82-8703) Avail: NTIS HC A03/MF A01

The evaluation of the various weld microstructures which are related to both the solidification behavior and the subsequent solid state transformations of austenitic stainless steels is discussed. To accomplish this, both Transmission Electron Microscopy and Scanning Transmission Electron Microscopy techniques were employed. DOE

N83-11319# Oak Ridge National Lab., Tenn. Mathematics and Statistics Research Dept.
MODEL OF BINARY-ALLOY SOLIDIFICATION
D. G. Wilson, A. D. Solomon, and V. Alexiades Aug. 1982 51 p refs
(Contract W-7405-eng-26)
(DE82-019723; ORNL/CSD-97) Avail: NTIS HC A04/MF A01

A linear model for the solidification of a dilute binary alloy is presented. In this model the solidus and liquidus curves are linear. As a consequence internal energy depends linearly upon temperature and concentration. The formulation is a generalization of the well known enthalpy method to treat a phase change problem involving coupled heat and mass transfer. Both analytic and numerical formulations are given. Results from the latter are presented and compared with an explicit solution of Rubinstein for a Stefan-like problem posed in a semiinfinite slab. Some remarks on the behavior of the explicit solution are given. DOE

N83-11320# Engins Matra, Velizy (France).
WATER SOLUBLE FLUXES [FLUX HYDROSOLUBLES]
P. Liot 28 Dec. 1981 40 p refs In FRENCH
(REQC-26576) Avail: NTIS HC A03/MF A01

Sixteen soldering fluxes were tested. Their composition was analyzed, including water solubility, chemical reactivity, and pH. Their effectiveness was measured in soldering copper. The removal

of post-soldering residues was studied. These fluxes perform as well as resinous fluxes. Washing with tap water is sufficient for removing residues. Economically, water soluble fluxes are attractive as tap water is cheaper than solvents needed to remove resinous flux residues. Author (ESA)

N83-11321# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE INFLUENCE OF DIFFERENT HEAT TREATMENTS ON STRESS CORROSION CRACKING IN THE ALUMINUM ALLOYS Al-7050 AND AZ 7461 [DE INVLOED VAN VERSCHILLENDE WARMTEBEHANDELINGEN OP DE SPANNINGSCORROSIE-GEVOELIGHEID VAN DE ALUMINIUM LEGERINGEN Al-7050 EN AZ 74.61]
H. F. deJong and R. R. Kalmann Mar. 1982 32 p refs In DUTCH; ENGLISH summary
(VTH-LR-346) Avail: NTIS HC A03/MF A01

Stress corrosion cracking (SCC) susceptibility of two Al-Zn-Mg forging alloys, Al-7050 and AZ 74.61, was investigated for different heat treatments. The constant strain rate (CSR) test method was used. Results of the CSR tests were compared with published constant total strain test results in order to demonstrate the validity of the CSR test method. Besides good agreement, the SCC susceptibility of the two specimen alloys was found. Results show that Al-7050 is superior to AZ 74.61 with respect to the combination of mechanical properties and SCC susceptibility. The heat treatment of Al-7050 in the as-received condition (heat treatment applied by the manufacturer) can be improved to give better mechanical properties at low SCC susceptibility.
Author (ESA)

N83-11322# Cambridge Univ. (England). Dept. of Engineering.
FRACTURE-MECHANISM FOR NICKEL, ALUMINIUM AND LEAD, AND CERTAIN OF THEIR ALLOYS
C. Gandhi, M. F. Ashby, and D. M. R. Taplin (Waterloo Univ.) 1977 45 p refs Sponsored in part by the British Science Research Council and the National Research Council of Canada
(PB82-189135; CUED/C/MATS/TR-33-1977; ISSN-0309-6505) Avail: NTIS HC A03/MF A01 CSCL 11F

The mechanisms of fracture of round tensile specimens of a number of f.c.c. metals and alloys were studied and reviewed. Recent observations were combined with a large body of published data and used to construct fracture mechanism maps which summarize the behavior. Maps are shown for commercially pure nickel, Nichrome, a Monel, nickel-2% thoria, Nimonic-80A and Inconel X-750; for pure and commercial 2S-grade aluminum and for RR-58; and for two grades of lead. Certain generalizations about fracture behavior can be drawn from comparisons of the maps. Author

N83-11323# National Building Research Inst., Pretoria (South Africa).
CORROSION OF REINFORCING STEEL AND OTHER METALS IN CONCRETE, AND THE POSSIBLE EFFECTS OF GALVANIC AND STRAY CURRENTS
C. E. Bird and B. G. Callaghan 1981 27 p refs
(PB82-186446; ISBN-0-620-02730-4) Avail: NTIS HC A03/MF A01 CSCL 11F

Various aspects related to the corrosion of reinforcing steel as well as other metals and metal coated steel, embedded in concrete structures exposed to aggressive environment are discussed on the basis of long term investigations. GRA

N83-11324# Technical Research Centre of Finland, Espoo. Metals Lab.
THE MICROMECHANISMS OF CLEAVAGE FRACTURE AND THEIR RELATIONSHIP TO FRACTURE TOUGHNESS IN A BAINITIC LOW ALLOY STEEL Ph.D. Thesis - Helsinki Univ.
Heikki Kotilainen 1980 136 p refs
(PB82-204207; Publ-23; ISBN-951-38-1014-3; ISSN-0355-3388) Avail: NTIS HC A07/MF A01 CSCL 11F

The plastic deformation and cleavage fracture of a bainitic Cr-Mo-V steel was studied. An estimate of the cleavage fracture strength was made using several methods. The physical meaning of the microscopical cleavage fracture strength is not clear, but it can be used in characterizing the cleavage fracture. The cleavage fracture strength can be correlated to the same factors which influence the yield strength. The characteristic distance does not correspond to any microstructural unit and it is about one order of magnitude larger than the fracture unit in bainite, which is the bainite packet. The notch root radius for the lower limit of the toughness is of the same order of magnitude as the characteristic distance. The temperature dependence of the fracture toughness was calculated using many methods. An approach for the estimation of the temperature dependence of the fracture toughness is proposed. This approach is based on the yielding processes at the crack tip. Finally the fracture mechanism in bainite was studied and a model for the mechanism which considers the real bainitic microstructure is proposed. GRA

N83-11325# Technical Research Centre of Finland, Espoo. Metals Lab.
INTERGRANULAR CORROSION TESTING OF AUSTENITIC STAINLESS STEELS
Irina AhoMantila, Pertti Aaltonen, and Hannu Hanninen Oct. 1981 85 p refs
(PB82-206251; VTT/RR-26/1981; ISBN-951-38-1324-X; ISSN-0358-5077) Copyright. Avail: NTIS HC A05/MF A01 CSCL 11F

Different standard intergranular corrosion (IC) test methods and an electrochemical potentiokinetic reactivation test method as well as anodic polarization and constant potential etching in perchloric acid solution was used to clarify the IC attack morphology in various test environments. The microstructures of austenitic stainless steels were characterized before testing by transmission electron microscopy and Auger electron spectroscopy and after testing by optical microscopy and scanning electron microscopy. Corrosion attack in steels (AISI 304, AISI 316, OX18H10T and SCR-1) in different heat treated conditions is compared. The suitability of nonstandardized methods for IC testing is evaluated as well as the suitability of the IC tests for different practical purposes. Author

N83-11326# Technical Research Centre of Finland, Espoo. Metals Lab.
GRAIN BOUNDARY SEGREGATION IN AUSTENITIC STAINLESS STEELS
Hannu Hanninen and Erkki Minni (Turku Univ.) Oct. 1981 28 p refs
(PB82-204637; VTT/RR-32/1981; ISBN-951-38-1315-0; ISSN-0358-5077) Avail: NTIS HC A03/MF A01 CSCL 11F

Grain boundary segregation use Auger electron spectroscopy was investigated. It was noted that after hydrogen charging of the specimens the grain boundaries of sensitized austenitic stainless steels could be broken up. The compositions of grain boundaries in two sensitized austenitic stainless steels (AISI 304 and AISI 321) were obtained. Also the depth distribution of segregated species is given, depicting the layered segregation profiles of phosphorus and sulfur. An example of impurity segregation at the interdendritic fracture surface of a hot crack in an austenitic stainless steel weld is also presented. Segregations of S, Nb, and P are observed. M.G.

N83-11046# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STRAIN FATIGUE PROPERTIES AND FATIGUE DISLOCATION STRUCTURES OF 2024 ALUMINUM ALLOY
Li Qingsheng, Tsai Chikung, Chen Xianxi, Pan Tianxi, and Zhou Zhaoxiang *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 140-149 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 11/6

N83-11053# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SUCCESS OF DYE FORGING TITANIUM DISCS ON A GUNPOWDER HAMMER
Li Chenggong *In its* Intern. Aviation (Selected Articles) (FTD-ID (RS)T-0679-82) 15 Jul. 1982 p 15-21 Transl. into ENGLISH from Guoji Hangkong (China), no. 2, Feb. 1982 p 25-27, 42-45 and 48 (For primary document see N83-11051 02-01)
Avail: NTIS HC A03/MF A01 CSCL 11/6

N83-11356# Electronic Systems Div., Hanscom AFB, Mass.
ACOUSTIC EMISSION TO STUDY EFFECTS OF THERMAL HISTORY AND MICROSTRUCTURE ON HYDROGEN EMBRITTLEMENT OF STAINLESS STEEL
Clement A. Tatro, Richard R. Vandervoort, and Marvin A. Hamstad *In* California Univ., Lawrence Livermore Lab. Mech. Eng. Res. Mar. 1982 p 1-4 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

N83-11360# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRODEPOSITION FOR SOLID STATE BONDING
J. W. Dini, W. K. Kelley, W. C. Cowden, and E. M. Lopez *In its* Mech. Eng. Res. Mar. 1982 p 13-19 refs (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-11327 National Physical Lab., Teddington (England). Div. of Materials Applications.
LONG TERM STRENGTH OF CHOPPED GLASS REINFORCED PLASTICS IN WATER Interim Report
J. Aveston and J. M. Sillwood Jul. 1982 13 p refs
(NPL-DMA(A)-46; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Data on the long-term strength of chopped strand mat glass reinforced polyester resin in water under static and fatigue loading are presented. Stress rupture in distilled water and in sulfuric acid, and time to failure in distilled water under fatigue loading with square and sine waves were tested, using 5 mm thick sheets. Time to failure was also tested in dry (ambient) conditions. Results indicate that failure depends on stress corrosion and cycle dependent fatigue. A semiempirical equation which enables extrapolation curves to be drawn is presented. Author (ESA)

N83-11328*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
SURFACE TEMPERATURES AND GLASSY STATE INVESTIGATIONS IN TRIBOLOGY, PART 5 Final Report
Scott Bair and Ward O. Winer Washington NASA Oct. 1982 64 p refs
(Grant NsG-3106)
(NASA-CR-3632; NAS 1.26:3632) Avail: NTIS HC A04/MF A01 CSCL 11B

Preliminary measurements of high shear rate viscosity at near atmospheric but variable pressure suggest the importance of low normal stress and cavitation or fluid fracture in the type of stress field existing in elastohydrodynam ic inlets and classical hydrodynamic configurations. An experimental basis is given for three regimes of traction in concentrated contacts: a thin film regime characterized by high traction and determined by lambda ratio, a thick film regime characterized by low traction and determined by the speed parameter, and the elastohydrodynamic regime for which traction is controlled by limiting shear stress. Traction measurements were performed with various liquids, two solid lubricants, and a grease. Film thickness and traction measurements of polymer blends and base oils are compared. A.R.H.

N83-11329*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DYNAMICS AND MECHANISM OF CAVITATION EROSION ON PERSPEX AND EPOXY RESINS TESTED IN A ROTATING DISK DEVICE
P. Veerabhadra Rao, N. S. Lakshmana Rao (Indian Inst. of Science, Bangalore), and B. C. Syamala Rao (Indian Inst. of Science, Bangalore) 1982 14 p refs Presented at the Cavitation and Polyphase Flow Forum, St. Louis, 7-11 Jun. 1982; sponsored by ASME
(NASA-TM-82962; E-1379; NAS 1.15:82962) Avail: NTIS HC A02/MF A01 CSCL 11G

The cavitation erosion behavior including the initiation, dynamics and mechanism of damage process on perspex and epoxy resin specimens tested in a rotating disk device were discussed with respect to exposure time. The inception of erosion always took place at the location nearest to the center of rotation of the disk. Subsequently, as exposure time increased, erosion initiated at other locations as well. Light optical photographs and scanning electron micrographs clearly indicate that most of the material loss appears to occur form the networks of cracks due to their interaction and pits indicate particle debris. The optical degradation (loss of transmittance) on perspex was observed to be more on the rear side than on the front side. Author

N83-11330*# British Columbia Univ., Vancouver.
COUNTERCURRENT DISTRIBUTION OF BIOLOGICAL CELLS Annual Progress Report, 1 Aug. 1981 - 31 Jul. 1982
30 Sep. 1982 28 p refs
(Contract NAS8-33575)
(NASA-CR-170652; NAS 1.26:170652) Avail: NTIS HC A03/MF A01 CSCL 11G

It is known that the addition of phosphate buffer to two polymer aqueous phase systems has a strong effect on the partition behavior of cells and other particles in such mixtures. The addition of sodium phosphate to aqueous poly(ethylene glycol) dextran phase systems causes a concentration-dependent shift in binodial on the phase diagram, progressively lowering the critical conditions for phase separation as the phosphate concentration is increased. Sodium chloride produces no significant shift in the critical point relative to the salt-free case. Accurate determinations of the phase diagram require measurements of the density of the phases; data is presented which allows this parameter to be calculated from polarimetric measurements of the dextran concentrations of both phases. Increasing polymer concentrations in the phase systems produce increasing preference of the phosphate for the dextran-rich bottom phase. Equilibrium dialysis experiments showed that poly(ethylene glycol) effectively rejected phosphate, and to a lesser extent chloride, but that dextran had little effect on the distribution of either salt. Increasing ionic strength via addition of 0.15 M NaCl to phase systems containing 0.01 M phosphate produces an increased concentration of phosphate ions in the bottom dextran-rich phase, the expected effect in this type of Donnan distribution. Author

N83-11331*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.
AIRCRAFT SURFACE COATINGS STUDY: VERIFICATION OF SELECTED MATERIALS Final Report, Apr. - Dec. 1979
Sep. 1980 79 p refs
(Contract NAS1-14742)
(NASA-CR-159288; NAS 1.26:159288; D6-48669) Avail: NTIS HC A05/MF A01 CSCL 11C

Three liquid coatings and four films that might improve and/or maintain the smoothness of transport aircraft surfaces are considered. Laboratory tests were performed on the liquid coatings (elastomeric polyurethanes) exposed to synthetic type hydraulic fluid, with and without a protective topcoat. Results were analyzed of a 14-month flight service evaluation of coatings applied to leading edges of an airline 727. Two additional airline service evaluations were initiated. Laboratory tests were conducted on the films, bonded to aluminum substrate with various adhesives, to determine the best film/adhesive combinations. A cost/benefits analysis was

performed and recommendations made for future work toward the application of this technology to commercial transports. Author

N83-11332# Texas Christian Univ., Fort Worth. Dept. of Chemistry.
SYNTHESIS OF (SILYLAMINO)PHOSPHINES BY THE WILBURN METHOD
Robert H. Neilson and Patty Wisian-Neilson 1 Aug. 1982 9 p refs Submitted for publication Sponsored in part by the Robert A. Welch Foundation
(Contract N00014-79-C-0632; NR Proj. 053-720)
(AD-A118122; TR-82-02) Avail: NTIS HC A02/MF A01 CSCL 07/3

Experimental details for the large scale (1-2 mol) synthesis of (silylamino)phosphines by the Wilburn method are described. In a one-pot procedure, treatment of PC13 with one equivalent of LiN(SiMe3)2 in Et20 at -78C followed by two equivalents of RMgX at OC affords 67-75% yields of (Me3Si)2NPR2 (R = Me, Et, CH2SiMe3). Similarly, (Me3Si)2NP(Ph)R (R = Me, Et) are obtained in 59-81% yields starting from PhPC12. Physical and 31P NMR data for these compounds are reported along with references to earlier papers describing their derivative chemistry. Author (GRA)

N83-11333# Midwest Research Inst., Kansas City, Mo.
MOISTURE-RESISTANT ADHESIVES Final Report, Aug. 1979 - Dec. 1981
Richard L. Elliott and Howard W. Christie Wright-Patterson AFB, Ohio AFWAL May 1982 71 p refs
(Contract F33615-79-C-5141; AF Proj. 2419)
(AD-A118019; AFWAL-TR-82-4043) Avail: NTIS HC A04/MF A01 CSCL 11/1

The objective of this project was to develop a systematic series of chemical, physical, and mechanical procedures which would allow timely, technically sound and cost-effective screening of new candidate resins which were available in limited quantities. GRA

N83-11334# Texas Christian Univ., Fort Worth. Dept. of Chemistry.
SYNTHESIS AND STEREOCHEMISTRY OF SOME (SILYLAMINO) PHOSPHINIMINES
Robert H. Neilson and Joseph S. Engenito, Jr. 1 Aug. 1982 21 p refs Submitted for publication
(Contract N00014-79-C-0632; NR Proj. 053-720)
(AD-A118005; TR-82-01) Avail: NTIS HC A02/MF A01 CSCL 07/3

A series of P-alkyl-P-halo substituted (silylamino) phosphinimines (Me3Si)2N-P(R)X=NSiMe3 are obtained either by oxidative addition or RI (R = Et, i-Pr, T-Bu) to (Me3Si)2N-P=NSiMe3 or by treatment of (Me3Si)2N)2PMe with I2 or Br2. Reaction of the iodophosphinimines with MeLi affords the dialkyl derivatives (Me3Si)2N-P(R)Me=NSiMe3 (R = Et, i-Pr, T-Bu). Alcoholysis of the t-BuI product in the presence of Et3N yields the N-H compounds Me3SiN(H)-P(t-Bu)OR=NSiMe3 (R = Me, CH2CF3). Variable-temperature 1H NMR studies of these (silylamino)phosphinimines demonstrate that, depending on what substituents are present, they may be fluxional via (1,3)-silyl exchange, hindered rotation about the amino P-N bond, or (1,3)-proton exchange. The results are discussed in terms of the electronic and steric effects of the phosphorus substituents. Author (GRA)

N83-11335# Army Mobility Equipment Research and Development Command, Fort Belvoir, Va. Material Technology Lab.
IDENTIFICATION OF DRYING OILS IN PAINTS BY GAS-LIQUID CHROMATOGRAPHY Interim Report
Laurie Herriott Jun. 1982 21 p refs
(AD-A118334; MERADCOM-2360) Avail: NTIS HC A02/MF A01 CSCL 07/4

The gas-liquid chromatographic method is for the identification of drying oils in paint. The identification is made from the distribution of fatty acids as methyl esters shown on the chromatogram.
Author (GRA)

N83-11336# Technischer Ueberwachungs-Verein Bayern e.V., Munich (West Germany). Arbeitsbereich Kunststoffpruefungen.
RESEARCH OF THE POSSIBLE USE OF GLASS REINFORCED PLASTIC PIPES (GRP) FOR LOAD DISTRIBUTION AND LONG DISTANCE DISTRIBUTION OF HEAT (SHORT VERSION) Final Report, Mar. 1980
Bernhard Schlehoefer, Arthur Mattern, Helmuth Zaglauer, and Bernhard Brand Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 127 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-130; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26,50

Heat distribution by a network where 7% of room heating and hot water use are provided through a distribution network of about 6000 km was studied. The most used medium is steam or superheated water in the temperature range from 110 to 130 C.A tendency is to use temperatures as low as 55 C because of the reduced heat losses. The good insulation characteristics and the ease of placing were in favor of the use of GRP, but long-term wearability research was necessary. In laboratory materials, burst resistance of pipes and creep were tested; after use in a heat production plant and in an underground buried network, pipes and fittings were examined. It is proved by extrapolation that GRP resist at least 50 years at a temperature of 110 C under 10 bar pressure. This was not true with the joints and the fittings especially when used at 130 C. At 110 C, the quantity of failures is obviously reduced, but a use without any problems is only possible if the critical failure points can be eliminated. The tests on buried pipe loops show a satisfactory result. Author (ESA)

N83-11337# National Bureau of Standards, Washington, D.C.
RELATIONSHIP BETWEEN MORPHOLOGY AND MECHANICAL PROPERTIES OF ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE Annual Report, 1 Oct. 1980 - 30 Sep. 1981
John M. Crissman, F. A. Khoury, and G. B. McKenna May 1982 62 p refs
(PB82-211426; NBSIR-82-2493; AR-2) Avail: NTIS HC A04/MF A01 CSCL 11L

Various aspects of ultrahigh molecular weight polyethylene (UHMWPE) investigated include: (1) the establishment of procedures for compression molding (under vacuum) sheets and cylinders of the polymer; (2) the influence of thermal history and molecular weight on time dependent mechanical behavior such as creep and stress relaxation in both uniaxial extension and compression; (3) dynamic fatigue under conditions of zero tension sinusoidal loading; (4) environmental stress-crack resistance; and (5) the optical and electron microscopy of sheets of the UHMWPE which were deformed to varying degrees in uniaxial extension.
Author

N83-11338# National Bureau of Standards, Washington, D.C.
APPLICATIONS OF PROOF TESTING TO BRITTLE MATERIALS AT HIGH TEMPERATURES Final Report
Nancy J. Tighe and Sheldon M. Wiederhorn Dec. 1981 201 p refs
(Contract DE-EA77-A01-6010)
(PB82-183005; NBSIR-81-2445) Avail: NTIS HC A10/MF A01 CSCL 11B

The theories of proof testing for assuring reliability are discussed, as well as experimental results obtained on silicon nitride tested at 1280 C. The important conclusion from the research is that the flow population which causes failure changes during exposure and produces new population. Approach which includes dynamic flow population was developed and is included in the report. The experimental data is presented in the form of a map which displays strength versus time under load. GRA

N83-11339# Texas Technological Univ., Lubbock. Inst. for Disaster Research.
EXPERIMENTAL STUDY OF EDGE DISPLACEMENTS OF LATERALLY LOADED WINDOW GLASS PLATES

Duncan C. Anions Jun. 1980 184 p refs
(PB82-183690; TTU-1DR-63D) Avail: NTIS HC A09/MF A01 CSCL 11C

The influence of boundary conditions on the response of window glass plates subject to uniform lateral loads is discussed. Displacements that can occur at the edge of a laterally loaded window glass plate under varying boundary conditions are discussed. The experimental facility which was used in the investigation is described and evaluations of experimental results are given, including comparisons between the measured displacements for different boundary conditions. It was concluded that: laterally loaded window glass plates experience significant rigid body motion; edges of laterally loaded window glass plates do not remain straight; boundary conditions influence the response (deformations and deflections) of laterally loaded window glass plates; and under large center of plate deflections the investigated boundary conditions approach a simply supported edge restraining condition (edges of plate free to slip in plane and rotate). GRA

N83-11216# Army Materials and Mechanics Research Center, Watertown, Mass. Polymer Research Div.
APPLICATION OF NEW TECHNIQUES FOR CURE MONITORING OF EPOXIES
Gary L. Hagnauer *In its* Proc. of the Critical Rev. May 1982 p 3-24 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11218# Sandia Labs., Albuquerque, N. Mex.
AN INTERFEROMETRIC STUDY OF EPOXY RESIN GELATION
K. R. Hirschbuehler *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 37-58 refs Document also announced as N82-16252 (For primary document see N83-11215 02-23)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A21/MF A01 CSCL 11/4

N83-11220# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
MICRODIELECTROMETRY
Stephen D. Senturia, Norman F. Sheppard, Steven L. Garverick, Huan L. Lee, and David R. Day *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 71-86 refs (For primary document see N83-11215 02-23)
(Grants NSF DMR-78-24815; NSF ENG-77-17219)
Avail: NTIS HC A21/MF A01 CSCL 11/3

N83-11232# Army Materials and Mechanics Research Center, Watertown, Mass.
APPLICATION OF FOURIER TRANSFORM INFRARED SPECTROSCOPY FOR QUALITY CONTROL ANALYSIS OF EPOXY RESIN PREPREGS USED IN HELICOPTER ROTOR BLADES
T. F. Saunders, M. Ciulla, S. Wehner, and J. Brown *In its* Proc. of the Critical Rev. May 1982 p 243-250 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/3

N83-11234# Lockheed Missiles and Space Co., Palo Alto, Calif.
RELATION BETWEEN INTERFACIAL PHENOMENA AND ADHESIVE BOND STRENGTH
Arthur D. Jonath and Joe L. Crowley *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 265-290 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/1

N83-11236# McDonnell-Douglas Research Labs., St. Louis, Mo.
THE USE OF CHEMILUMINESCENCE TO MONITOR THE AGING PROCESSES IN POLYMERS AND COMPOSITES
Clarence J. Wolf and Dale L. Fanter *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 311-324 (For primary document see N83-11215 02-23)
(Contract N00019-80-C-0102)
Avail: NTIS HC A21/MF A01 CSCL 11/7

N83-11237# Northwestern Univ., Evanston, Ill. Materials Research Center.
THERMALLY STIMULATED DISCHARGE MEASUREMENT AND PROPERTY CHARACTERIZATION OF EPOXY RESIN SYSTEMS
J. O. Brittain, S. H. Carr, and T. D. Chang *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 325-338 (For primary document see N83-11215 02-23)
(Grant NSF DMR-76-80847)
Avail: NTIS HC A21/MF A01 CSCL 11/7

N83-11238# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemical Engineering.
PHYSICAL AGING STUDIES OF EPOXY RESINS WITH EMPHASIS ON GRAPHITE FIBER-EPOXY COMPOSITES
Yousef Mohajer, Elaine Yorkgitis, Garth Wilkes, and James McGrath *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 339-370 refs Document also anounced as A82-11293 (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

N83-11241# Naval Surface Weapons Center, White Oak, Md.
CALCULATION OF STRUCTURAL PARAMETERS IN MODEL EPOXY SYSTEMS
Bruce Hartmann and Gilbert F. Lee *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 401-414 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

N83-11242# Naval Research Lab., Washington, D. C.
THE FRACTURE OF ELASTOMER MODIFIED EPOXIES IN BULK AND AS MATRIX RESINS
W. L. Bascom *In* Army Materials and Mechanics Research Center Proc. of the Critical Rev. May 1982 p 415-422 refs (For primary document see N83-11215 02-23)
Avail: NTIS HC A21/MF A01 CSCL 11/7

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-11340*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RECENT TRENDS IN AVIATION TURBINE FUEL PROPERTIES
Robert Friedman Oct. 1982 33 p refs
(NASA-TP-2056; E-1127; NAS 1.60:2056) Avail: NTIS HC A03/MF A01 CSCL 21D

Plots and tables, compiled from Department of Energy (and predecessor agency) inspection reports from 1969 to 1980, present ranges, averages, extremes, and trends for most of the 22 properties of Jet A aviation turbine fuel. In recent years, average values of aromatics content, mercaptan sulfur content, distillation temperature of 10 percent recovered, smoke point, and freezing point show small but recognizable trends toward their specification limits. About 80 percent of the fuel samples had at least one property near specification, defined as within a standard band about the specification limit. By far the most common near-specification properties were aromatics content, smoke point, and freezing point. Author

N83-11341# Computer Sciences Corp., Bay St. Louis, Miss. Hazard Range Facility.
NONPROPAGATION TEST PROGRAM FOR M55 STAB DETONATORS Final Report, Oct. 1979 - Sep. 1980
F. L. McIntyre and W. M. Stirrat (Army Armament Res. and Devel. Command, Dover, N.J.) Dover, N.J. Army Armament Res. and Devel. Command Jul. 1982 36 p
(Contract NA13-50)

(AD-A118381; AD-E400872; ARLCD-CR-82036) Avail: NTIS HC A03/MF A01 CSCL 19/1

As part of an Army-wide expansion and modernization program, the safety of M55 detonators at various points within automated inspection equipment was studied using an MRC Corporation prototype. Test results will be used to establish safety criteria for new manufacturing LAP facilities. The program to determine the safety of the equipment was drafted by ARRADCOM and was subsequently divided into six separate phases: input/output transfer tests, intra-tray propagation tests, indexing dial spacing tests, rejected detonator container tests, indexing dial nest integrity tests, and shipping tray integrity tests. Results of these tests indicated that: (1) A maximum of four detonators can ignite simultaneously without rupturing the outer field. (2) A minimum shield height of 50.8 mm is required for complete nonpropagation between detonators within a single tray. (3) The existing machine spacing of 50.0 mm between detonators on the inspection dial is sufficient. (4) The prototype container is safe for storage of 200 to 300 detonators. (5) There was no detonator reaction upon transfer to the dial nests at transfer rates of 13.7 m/sec. (6) A safe transfer is possible when using the MRC metering valve; the setting on the valve should not exceed the 2.0 setting. GRA

N83-11342# Air Force Armament Lab., Eglin AFB, Fla. Direct Fire Weapons Div.

AMBIENT MOISTURE EFFECTS AND CLOSED VESSEL STUDIES OF GUN PROPELLANT COMBUSTION Final Report, Feb. 1981 - Mar. 1982

Otto K. Heiney, Douglas L. Burkett, James F. Whidden, and Terrell W. Shiver May 1982 40 p refs

(AF Proj. 2560)

(AD-A118377; AFATL-TR-82-32) Avail: NTIS HC A03/MF A01 CSCL 19/1

This report covers several topics in the field of solid gun propellant combustion. They include: (1) mass spectrometry to define experimentally the gas properties of gun propellant combustion and correlate these experimental results with theoretical predictions; (2) the use of closed combustion bomb pressurization rates to extract solid propellant linear burning rate values is discussed, and correlations with strand burner data are considered; (3) the effects of moisture adsorption on solid propellant combustion rates and energy are experimentally defined; and (4) a reference section of solid propellant combustion product specific heat ratio values is provided. GRA

N83-11343# Air Force Armament Lab., Eglin AFB, Fla. Direct Fire Weapons Div.

BALLISTIC CRITERIA FOR PROPELLANT GRAIN FRACTURE IN THE GAU-8/A 30 MM GUN Final Report, Nov. - Dec. 1981

Clifford W. Fong and Bertram K. Moy Mar. 1982 57 p refs

(AF Proj. 2560)

(AD-A118376; AD-E800561; AFATL-TR-82-21) Avail: NTIS HC A04/MF A01 CSCL 19/1

From plots of the square of the muzzle velocity compared to peak pressure (proportional to the piezometric efficiency) versus temperature derived from multiple GAU-8 gun firings over the temperature range minus 50 degrees Centigrade to plus 70 degrees Centigrade, it is possible to derive criteria for propellant grain fracture during the ballistic cycle. Propellants which do not undergo loss of mechanical integrity show a linear relationship between the square of the muzzle velocity compared to peak pressure and temperature, with negative slopes. In this study it has been found that the single base propellants, CIL 3532 and CIL 3331, the current USAF GAU-8/A propellant (GAU-8 extract) and three high performance, cool burning candidate propellants for the GAU-8/A gun (IH.3, IH.5 and ABL 20/21) do not show detectable grain breakup during the ballistic cycle. Propellants which undergo grain fracture during the ballistic cycle exhibit marked reduction in piezometric efficiencies and consequent deviations from the usual linear relationship between the square of the muzzle velocity compared to peak pressure and temperature. Subambient temperature brittle fracture is usually also accompanied by marked scatter of the square of the muzzle velocity compared to peak pressure values leading to high standard deviation error estimates. Such behavior has been observed in this study for all the triple base propellants Nos. 24, 34, 35, 46, 50/51/52 and 55. However, a triple base propellant (M30 MOD) containing ground nitroguanidine (as opposed to the unground nitroguanidine contained in the other triple base propellants investigated) exhibited a marked improvement in low temperature brittle fracture properties. GRA

N83-11344# Air Force Armament Lab., Eglin AFB, Fla. Direct Fire Weapons Div.

THE FORMATION OF COLORED IMPURITIES IN TRIAMINOGUANIDINE NITRATE AND RELATED INCOMPATIBILITY PROBLEMS IN GUN PROPELLANTS Final Report, Aug. - Sep. 1981

Clifford W. Fong Nov. 1981 36 p refs

(AF Proj. 2560)

(AD-A118375; AD-E800557; AFATL-TR81-101) Avail: NTIS HC A03/MF A01 CSCL 19/1

A mechanism has been proposed for the formation of colored impurities in triaminoguanidine nitrate. It is suggested that the rate determining step for color formation is the production of the free base, triaminoguanidine, from triaminoguanidine nitrate. The multitude of colored impurities arise either from the metal ion induced oxidation or the aerial oxidation of triaminoguanidine or subsequent reactions of these oxidation products. The aerial oxidation processes are enhanced in the presence of bases. The aerial oxidation process is also strongly catalyzed by metal ions. It is recommended that purification and storage of triaminoguanidine nitrate is best carried out in acidified water in non-metallic apparatus. The optimum conditions for the synthesis of triaminoguanidine nitrate, such that the production of colored impurities is minimized, would appear to involve an aqueous medium kept free of metal ions, minimal alkaline conditions and the absence of atmospheric oxygen. Propellants containing contaminated triaminoguanidine can undergo various color changes during manufacture which may cause porosity in the propellant, leading to enhanced and erratic burning rates. Strategies to minimize introduction of impurities which may cause incompatibility problems during the formulation of propellant are discussed. GRA

N83-11345# Colorado Univ., Boulder.

A FUNDAMENTAL MATHEMATICAL THEORY FOR THERMAL EXPLOSIONS IN RIGID SOLIDS AND IN GASES Final Report, 1 May 1979 - 30 Apr. 1982

J. Bebernes and D. R. Kassoy 8 Jul. 1982 18 p refs

(Contract DAAG29-79-C-0084)

(AD-A118150; CUCOMB-1; ARO-16480.8-MA) Avail: NTIS HC A02/MF A01 CSCL 19/4

A study has been made of the evolution of spatially variable thermal explosion processes occurring in finite systems. Mathematical models have been developed for both rigid systems and for combustible, compressible gas mixtures. Purely thermal processes occur in the former. Gasdynamic events play a significant role in the latter. Solution development is carried out in terms of asymptotic expansions valid for the limit of high activation energy. Physical processes occurring on disparate time length scales are systematically delineated. Spontaneously ignited reaction processes are shown to evolve into highly localized hot spots in both rigid and gaseous systems. In the latter case gas expansion processes cause a mechanical response in the system that leads to acoustic fields and significant gasdynamical processes. Detailed solutions are presented for symmetrical systems (slabs, cylinders and spheres). More general systems are studied by using qualitative analytical tools to ascertain fundamental solution properties like bounds on trajectories, estimates of escape time (thermal runaway) and effects of compressibility on thermal runaway. Author (GRA)

N83-11346# Army Armament Research and Development Command, Dover, N. J. Fire Control and Small Caliber Weapon Systems Lab.

VISCO-ELASTIC BEHAVIOR OF INCENDIARY COMPOSITIONS UNDER BALLISTIC LOADING

Walter H. Squire and Lamont W. Garnett 18 Jun. 1982 13 p refs
(AD-A118401) Avail: NTIS HC A02/MF A01 CSCL 19/1

The defeat of both personnel and materiel type targets on the modern battlefield is accomplished in the most cost effective means through the terminal effects of blast, fire, and fragmentation. These terminal effects are quite easily realized through the functioning of a high explosive projectile. While the terminal effects of gun-launched, high explosive projectiles is a well-accepted fact, munition designers must incorporate independent safing, arming, and functioning mechanisms into the munition. In general, gun-launched, high explosive projectiles are required to be safe from accidental or premature initiation during transportation and handling and while being fed into the weapon. However, once the projectile has been launched and directed toward the target, an arming mechanism is required to render -- on a reliable and predictable basis -- the projectile in a state for functioning given its interaction with the target. Lastly, when the high explosive does engage the target, a functioning mechanism must be provided to initiate the explosive charge in a high order detonation. Traditionally, these performance requirements for independent safing, arming, and functioning are accomplished through a conventional mechanical or electrical fuze. GRA

N83-11347# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
BEHAVIOR OF ALUMINUM IN SOLID PROPELLANT COMBUSTION Scientific Report, 1 Oct. 1977 - 28 Feb. 1982
E. W. Price, R. K. Sigman, J. K. Sambamurthi, and C. J. Park Jun. 1982 98 p refs
(Contracts F49620-78-C-0003; F49620-82-C-0013)
(AD-A118128) Avail: NTIS HC A05/MF A01 CSCL 11/6

This report is concerned with achieving improved combustion of the aluminum ingredient in solid propellant. The approach is to clarify understanding of the complex detailed process exhibited by aluminum and relate them to control of propellant burning rate, combustion stability, combustion efficiency and two phase flow behavior in the motor. A series of experiments were contrived to elucidate the microscopic details of aluminum behavior and their relation to microscopic details of the propellant, and to behavior of the other propellant ingredients. Author (GRA)

N83-11348# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
REACTIVITY OF EXPLOSIVES/SEDIMENT MIXTURES
Maurice S. Kirshenbaum May 1982 30 p refs
(AD-A118012; AD-E400840; ARLCD-TR-82007) Avail: NTIS HC A03/MF A01 CSCL 19/1

The hazards associated with the excavation, transportation, and incineration of dry humus sediments contaminated with TNT and/or RDX were assessed. Impact, friction, electrostatic, shock, and thermal sensitivity tests revealed that the shock hazard was the controlling factor in determining the safe explosive concentrations. The test method used indicates that there is probably no explosive hazard if the total concentrations of the energetic materials are not greater than 25% by weight and the sediments in the incinerator are unconfined. GRA

N83-11349# Cornell Univ., Ithaca, N. Y. School of Chemical Engineering.
COMPUTER SIMULATION AND MOLECULAR THEORY STUDIES OF NATURAL GAS MIXTURES Annual Report, 1 Jan. 1980 - 31 Dec. 1980
K. E. Gubbins 31 Jan. 1982 22 p refs Sponsored by Gas Research Inst.
(PB82-22060; GRI-81/0040) Avail: NTIS HC A02/MF A01 CSCL 21D

A technique was developed which enables the chemical potential to be calculated accurately in liquid mixtures by computer simulation. Calculations produce activity coefficients and Henry constants with an accuracy of 1 to 2%. Results were obtained for highly nonideal mixtures, and were used to test predictive methods for such mixtures. Simulation methods for studying polar liquids were also developed. The perturbation theory equation of state was compared with existing engineering methods, and was found to give much better results for mixtures containing polar fluids, particularly when no mixture data is available. This equation of state was used to study supercritical fluid equilibria. Correlations for Henry constants for systems with dissolved gases or solids were developed. M.G.

N83-11350# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PROPULSION AND ENERGETICS PANEL, WORKING GROUP 13 ON ALTERNATIVE JET ENGINE FUELS. VOLUME 1: EXECUTIVE SUMMARY
R. B. Whyte, ed. Jul. 1982 16 p 2 Vol.
(AGARD-AR-181-Vol-1) Avail: NTIS HC A02/MF A01

Alternative fuels for gas turbine engines which may entail considerable changes in fuel properties and relaxation of key items in present specifications to ensure adequate supplies are studied. The physical properties as well as the hydrocarbon composition of the fuels and their effects on handling and storage, aircraft fuel systems and engines are investigated. S.L.

N83-11351# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PROPULSION AND ENERGETICS PANEL, WORKING GROUP 13 ON ALTERNATIVE JET ENGINE FUELS. VOLUME 2: MAIN REPORT
R. B. Whyte, ed. Jul. 1982 169 p 2 Vol.
(AGARD-AR-181-Vol-2) Avail: NTIS HC A08/MF A01

Supply/demand of jet engine fuels for use by the in aeronautical research and development efforts was forecast. The effects of potential variations in hydrocarbon fuel properties on the performance, operating envelope, exhaust emissions, durability, maintainability, reliability and safety of aviation gas turbine aircraft was assessed. S.L.

N83-11161# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LIQUID-FUEL ROCKET ENGINE FOOD: DEVELOPMENT AND PROSPECTS FOR LIQUID PROPELLENTS
Liu Songwen *In its* Spaceflight (Selected Articles) (FTD-ID(RS)T-0585-82) 1 Jul. 1982 p 8-12 Transl. into ENGLISH from Hangtian (Communist China), no. 1, 1982 p 1-2, 4-7, 20 and 28 (For primary document see N83-11159 02-12)
Avail: NTIS HC A02/MF A01 CSCL 21/9

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-11352 Royal Signals and Radar Establishment, Malvern (England).
A CHEMICAL MILLING METHOD OF PRODUCING THIN WALLED WAVEGUIDE THERMAL ISOLATING SECTIONS
N. Harris Feb. 1982 6 p refs
(RSRE-Memo-3438; BR82721) Copyright. Avail: Issuing Activity

A process by which the wall thickness of copper waveguide sections can be reduced to 0.10 mm is described. Mask off, using stopping off medium, air dry and repeat. Seal off flange ends with plating tape. Submerge in stripper solution (40% nitric acid, 45% fluoboric acid) until the desired wall thickness is achieved. Erosion rate is approximately 25 microns per 31/2 min. During final stages of etching period, micrometer measurements are necessary. The finished guide width can be controlled to better than 50 microns, i.e. 25 microns on wall thickness. Measurements should be taken along edge of waveguide thereby eliminating possible distortion of the final fragile walls and degradation of the internal profile. Remove from etchant, neutralize, and wash. Do not use potting for reinforcing; use glass fiber laminate.
Author (ESA)

N83-11353# Naval Ship Research and Development Center, Bethesda, Md.
EXPERIMENTAL PERFORMANCE OF A FLAPPED HYDROFOIL IN CALM WATER A LOW FROUDE NUMBERS Final Report
Michael B. Wilson Jun. 1982 99 p refs
(AD-A118190; DTNSRDC-82/002) Avail: NTIS HC A05/MF A01 CSCL 13/10

Results of an experimental investigation are presented for the subcavitating hydrodynamic force performance of an aspect ratio 6, NACA 64 A010 foil section, plain-flapped, rectangular planform hydrofoil. The forward-leading sting-supported foil model was operated in calm water in the speed range of chord Froude numbers 1.22 to 4.23, at five depth-to-chord submergence ratios varying from 0.25 to 4.0. The results, presented in coefficient form, include the basic measured foil-along lift and drag, increments and flap effectiveness due to flap deflection, and the inferred variation of hydrofoil drag-due-to-lift for lift coefficients as high as 1.0. These data cover an important low Froude number speed regime not normally included in published hydrofoil performance experiments. Comparisons are made between the experimental results for residual drag and two different analytical prediction schemes for the hydrofoil total drag-due-to-lift. It is shown that experimental values for residual drag are bounded below and above by the two prediction methods considered, and that the discrepancies are largest at low Froude numbers. Author (GRA)

N83-11354# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
CAVITATION-FREE BUCKETS OF YS-920 AND NACA 66 (MOD) FOIL SECTIONS
Y. T. Shen Jul. 1982 19 p refs
(SR0230101)
(AD-A118104; DTNSRDC/SPD-1049-01) Avail: NTIS HC A02/MF A01 CSCL 20/4

Based on a wing section design theory and boundary layer calculations, a new series of hydrofoil sections with improved cavitation inception characteristics were theoretically developed and presented in previous papers. To verify these theoretical results experimentally, two hydrofoil models, one a newly developed profile designated YS-920 and the other an NACA-66 (MOD) wing section, were tested in high-speed water tunnel. The measurements included force and moment data, flow visualization, cavitation characteristics, and surface roughness effect on cavitation. In this report, the measured cavitation-free buckets of YS-920 and NACA-66 (MOD) foil sections are presented and compared with theoretical predictions. The ability to achieve a significant delay in cavitation inception with a newly designed profile is clearly demonstrated experimentally. GRA

N83-11355# California Univ., Livermore. Lawrence Livermore Lab.
MECHANICAL ENGINEERING RESEARCH Quarterly Progress Report, Jan. - Mar. 1982
William W. Feng, ed. Mar. 1982 48 p refs
(Contract W-7405-eng-48)
(DE82-017550; UCID-19323-82-1; QPR-2) Avail: NTIS HC A03/MF A01

Progress in the Mechanical Engineering Research in support of the Weapons Program is presented. Key mechanical technologies needed that will not be provided by outside sources are emphasized. Subjects covered are Material Characterization, Fabrication Technology, and Nondestructive Evaluation. For individual titles, see N83-11356 through N83-11363.

N83-11356# Electronic Systems Div., Hanscom AFB, Mass.
ACOUSTIC EMISSION TO STUDY EFFECTS OF THERMAL HISTORY AND MICROSTRUCTURE ON HYDROGEN EMBRITTLEMENT OF STAINLESS STEEL **c26**
Clement A. Tatro, Richard R. Vandervoort, and Marvin A. Hamstad *In* California Univ., Lawrence Livermore Lab. Mech. Eng. Res. Mar. 1982 p 1-4 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

Testing of the first set of stainless steel specimens with four different microstructures proceeded far enough to permit some definite conclusions concerning the acoustic emission behavior of the material and its microstructural origin. The work to date has been sufficiently encouraging that the decision to proceed with fabrication of compact fracture toughness specimens for the hydrogen pressure chamber and a second set of tension and compression specimens to be hydrogen charged has been made. Author

N83-11357# Electronic Systems Div., Hanscom AFB, Mass.
TEMPERATURE AND RATE EFFECTS ON ELASTIC-PLASTIC FRACTURE BEHAVIOR **c39**
Ronald D. Streit and Alfred Goldberg *In* California Univ., Lawrence Livermore Lab. Mech. Eng. Res. Mar. 1982 p 5-7 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

Work is continuing on the temperature and rate effects on elastic-plastic fracture. All phases of the work have been initiated. However, limited technician availability and job priorities have limited the extent of testing. This may cause delays in other areas of work as well if testing is not completed. The level of effort is expected to increase in the following six months. Author

N83-11358# California Univ., Livermore. Lawrence Livermore Lab.
NONLINEAR DEFORMATION OF ELASTOMERIC CUSHIONS **c39**
R. M. Christensen and W. W. Feng *In its* Mech. Eng. Res. Mar. 1982 p 8-9 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

A procedure is developed whereby the porosity and the vinyl content in silicone/vinyl cushions can be predicted in order to meet a specified level of stress at a specified level of compressive deformation. The method is based upon the theoretical analysis of foam deformation. Illustrative design examples are developed. Author

N83-11359# California Univ., Livermore. Lawrence Livermore Lab.
DIAMOND TURNING MACHINE NO. 3 **c37**
D. L. Carter *In its* Mech. Eng. Res. Mar. 1982 p 10-12 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

There are no major technical obstacles which will delay the turning of a part by June 1983, using the new Diamond Turning Machine-3 (DTM-3). The goal in turning a part is that the machine will do as well as the DTM-2 in turning the first part. Author

N83-11360# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRODEPOSITION FOR SOLID STATE BONDING **c26**
J. W. Dini, W. K. Kelley, W. C. Cowden, and E. M. Lopez *In its* Mech. Eng. Res. Mar. 1982 p 13-19 refs (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

Procedures for preparing stainless steel, aluminum and beryllium for plating have been developed and quantified and a factorial experiment with solid state bonded stainless steel specimens has been started. Results to date have been quite encouraging and show that strong joints can be obtained with electroplated stainless steel parts. Author

N83-11361# California Univ., Livermore. Lawrence Livermore Lab.
ARC WELDING **c37**
C. S. Lanoram *In its* Mech. Eng. Res. Mar. 1982 p 20-24 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

In previous work, measurements of fusion zone energy transfer modes were made for one process (arc welding) and one material (lead). This year's work extends that previous research to other lower melting point materials (bismuth) as well as to

materials having moderately high melting points (nickel, stainless 304). L.F.M.

N83-11362# California Univ., Livermore. Lawrence Livermore Lab.
AN ACOUSTIC MICROSCOPE FOR SURFACE CHARACTERIZATION c35
Bruce W. Maxfield *In its* Mech. Eng. Res. Mar. 1982 p 25-30 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

Progress on the development of a wide-angle, focused-beam acoustic microscope is presented. In the imaging mode, the tightly focused-beam is raster-scanned over the surface while simultaneously measuring the reflected signal. The beam may be focused beneath the surface in order to image subsurface features. Thus, it is possible to detect subsurface cracking introduced by machining or interfacial voids or disbonds in coatings. L.F.M.

N83-11363# California Univ., Livermore. Lawrence Livermore Lab.
THERMOELASTIC ULTRASONIC NDE c38
J. L. Opsal, A. Rosencwaig, and W. W. Wilcox *In its* Mech. Eng. Res. Mar. 1982 p 32-37 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

Using a conventional strobe light we have succeeded in detecting the thermoelastic waves produced in a clear lucite sample within which a small local optical absorber is located. The differential heating at the site of the flaw produces a thermoelastic signal which is indicative of the shape of the flaw. In effect we produce a resonant ultrasonic emission from the flaw. These signals can be detected with very small optical pulses if averaging over many pulses is possible. Positive results have been obtained in visualizing ultrasonic waves in water and in lucite with Schlieren imaging. In particular we have been successful in visualizing a CW ultrasonic wave using a laser beam modulated at the same frequency. L.F.M.

N83-11364# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Inst. fuer Tiefbohrkunde und Erdoegewinnung.
IMPROVEMENT OF THE CASING CEMENTATION OF DEEP AND ULTRADEEP WELLS. PART 1: DRILLING MUDS AND WASHING FLUIDS Final Report, May 1981
Karl-Heinz Arens and Manfred Akstinat Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 137 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-T-82-111-Pt-1; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

Drilling muds, washers, and washing fluids were investigated in order to improve the casing cementation of deep and ultradeep wells. Rheological requirements, the temperature stability of mud systems and the properties of nondamaging drilling muds were studied. For washing fluids, two test methods were developed and the necessity of filter cake removal was shown. The efficiency of several washing fluids was compared and evaluated for various mud systems (drilling muds with and without clays). Author (ESA)

N83-11365# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Inst. fuer Tiefbohrkunde und Erdoegewinnung.
IMPROVEMENT OF CASING CEMENTATION OF DEEP AND ULTRADEEP WELLS. PART 2: OILFIELD CEMENTS AND CEMENT ADDITIVES Final Report, May 1981
Karl-Heinz Arens and Manfred Akstinat Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 115 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-T-82-112-Pt-2; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24

Oilfield cements and cement additives were investigated in order to improve the casing cementation of deep and ultradeep wells. Characterization and evaluation of the main oil field cements commercially available were studied. The testing was carried out according to American Petroleum Institute API standards and nonstandardized test methods (dynamic modulus of elasticity, expansion/shrinkage), especially the rheology, thickening time and the influence of pressure, temperature and water-cement ratio, were considered. The main emphasis in the field of cement additives was on the evaluation of cement retarders for high temperatures, accelerators, and additives for cement expansion. Furthermore oil field cements were tested, and their properties are described. Author (ESA)

N83-11366# Battelle Inst., Frankfurt am Main (West Germany). Hauptabt. Materialtechnologie.
IMPROVEMENT OF CONDITIONS IN FOUNDRY WORKPLACES, USING NEW CERAMIC MOLD MATERIALS FOR FULL MOLD CASTING Final Report, Sep. 1980
Helmut Heide, Robert C. Sherriff, Guenther Broetz, and Georg-Michael Daerr Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 41 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-82-015; ISSN-0171-7618) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9

Castable calcium silicate hydrate (CSH) mold materials were developed for the manufacture of lost (combustible) polystyrene molds. General introduction of full mold casting is in the interest of the humanization of conditions in foundry workplaces since it reduces the work involved in fettling and deburring the cast parts. The development was achieved by incorporating thermally conductive SiC components into the CSH materials. Parts of molds relevant to foundry technology were then made from polystyrene in thin walled SiC-filled molds. These results, achieved in the laboratory, can now be applied on an industrial scale in the production of molds. Author (ESA)

N83-11367# Stihl (Andreas), Waiblingen (West Germany).
INTEGRATED JOB STRUCTURING USING THE EXAMPLE OF SMALL ENGINE ASSEMBLY IN A MEDIUM-SIZED COMPANY, PRELIMINARY PHASE Final Report, May 1979
Wolfgang Moeller Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 84 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-82-011; ISSN-0171-7618) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,50

In chain saw assembly, nine different models in up to sixteen versions were produced on nine assembly lines, using a job cycling cycle of 1.5 minutes. The existing layout permitted nonflexibility from a technical point of view and no latitude from the workers point of view. It was decided to make changes and planning was undertaken. This included planning of graduated assembly structures, higher on-the-job qualifications of workers, technological studies, production control and material logistics, variable work time, and integration of older and ailing workers. The planned assembly structures are graduated to include currently used systems, intermediate structures with varying work place and section buffers, and a structure with a job content of 6 minutes and a work place buffer of 60 minutes. A test cubicle reducing the noise level and a multiple screwdrivers station, reducing the workers arm load, were developed. With regard to variable time working, it is proved that in a two shift system this work method can only be applied where work place capacity is higher than the number of workers. Author (ESA)

N83-11368# Bergbau-Forschung G.m.b.H., Essen (West Germany).
MEASUREMENTS ON FULL-FACE TUNNELING MACHINES Final Report, Mar. 1981
Werner Wehrmann Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 129 p refs In GERMAN; ENGLISH

summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-121; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

The successful preliminary lab tests on the data logging and transmission unit, designed to collect important equipment parameters needed to improve the full-facers in service, showed they were not able to withstand the rough underground conditions. The difficulties encountered could be identified only by systematic investigation. The used method was a systematic logging of the entire drilling cycle and analysis of the problem points. It was possible to log load distributions at the rotating drilling head of selected disk cutter tools during fully automated underground roadheading operations of a 6m diameter full-facer. Weak points were identified. The improvement enables faster and more accurate instructions, leading to an optimization of driving operations. The process makes it possible to transmit, store, record, and evaluate all the important equipment parameters. It is possible to develop an early warning and monitoring system which can supply correct information on both the conditions of the heading as well on the wear of cutters. Author (ESA)

N83-11369# Texas Univ., Austin. Center for Transportation Research.
POLYMER CONCRETE FOR PRECAST REPAIR OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ON IH 30, NEAR MT. PLEASANT Interim Report
Alvin M. Meyer, B. Frank McCullough, and David W. Fowler Aug. 1981 49 p Sponsored in part by Texas State Dept. of Highways and Public Transportation and Federal Highway Administration
(PB82-197229; RR-246-1; FHWA/TX-81-26-246-1) Avail: NTIS HC A03/MF A01 CSCL 13C

Two punchout repairs made in a continuously reinforced concrete pavement (CRCP) using precast portland cement panels are described. The two repairs, one 1.44 sq. ft., the other 36 sq. ft., were completed and opened to traffic in one afternoon. This technique provides a rapid method of repair that produces a repair that is structurally as good or better than the surrounding pavement. With a trained crew, the repair time can be reduced and thus reducing lane closure time. Since lane closure time is a critical consideration in high volume highways, this method is cost effective in those areas. GRA

N83-11370# Oklahoma Dept. of Transportation, Oklahoma City. Research and Development Div.
EPOXY COATED REINFORCED STEEL IN BRIDGE DECKS Final Report, Jul. 1978 - Nov. 1981
Ghasem Pourkhosrow Nov. 1981 58 p refs Sponsored by Federal Highway Administration
(PB82-196122; FHWA/OK-81/3) Avail: NTIS HC A04/MF A01 CSCL 13C

Fusion-bonded epoxy coatings were applied to rebars in bridge decks. A thin film of epoxy resin is fusion bonded to the reinforcing steel as a prevention against corrosion. A monitoring system was established to measure electrical resistance for several years after installation. GRA

N83-11371# Arizona State Univ., Tempe. Transportation Research Center.
LABORATORY EVALUATION OF A CHEMICAL COUPLING AGENT TO PREVENT DEBONDING OF ASPHALTS FROM AGGREGATES
Joseph A. DiVito Aug. 1981 30 p refs
(PB82-195504; FHWA/AZ-81/178) Avail: NTIS HC A03/MF A01 CSCL 13C

Debonding of asphalt from mineral aggregates (stripping) was investigated. A silane coupling agent was compared with a well known, commercially available liquid antistrip (amine) in the immersion compression and double punch debonding tests on two Arizona mineral aggregate sources. The silane was used as a mineral aggregate pretreatment while the amine was added to the asphalt. It is indicated that the silane generally performed as well as the liquid antistrip or better. GRA

N83-11372# Cornell Univ., Ithaca, N. Y. Dept. of Structural Engineering.
LOCAL BOND BETWEEN A REINFORCING BAR AND CONCRETE UNDER HIGH INTENSITY CYCLIC LOAD
Siripong Hungspreug, Peter Gergely, Anthony R. Ingraffia, and Richard N. White Jan. 1981 475 p refs
(Grant NSF PFR-79-00711)
(PB82-193632; NSF/CEE-81087; CU-81-6) Avail: NTIS HC A20/MF A01 CSCL 13C

The local bond behavior of single, double, and triple ribbed reinforcing bars in concrete under high intensity cyclic loads was studied. Loading history, confining pressure, number of ribs, and direction of loading relative to the direction of casting were tested. It is shown that loading history with loading amplitude less than about half of the ultimate load does not affect the bond stiffness of the ultimate bond strength. The amount and rate of increase of slip were higher for specimens under reversed cyclic load than for those under repeated load. The confining pressure increases the ultimate bond strength and the ductility, but the bond stiffness remains the same. Elastic axisymmetric finite element analyses were performed on a triple bar embedded in a concrete cylinder. It is found that a proposed local bond slip curve is a useful model for explaining bond slip behavior and that stiffness at various stages of loading can be used for data input for the finite element analysis. GRA

N83-11373# California Univ., Berkeley. Dept. of Civil Engineering.
TREMIE CONCRETE FOR BRIDGE PIERS AND OTHER MASSIVE UNDERWATER PLACEMENTS Final Report
Ben C. Gerwick, Jr., Terence C. Holland, and G. Juri Komendant Sep. 1981 207 p refs Sponsored in part by NOAA, Calif. State Resources Agency
(Contract DOT-FH-11-9402)
(PB82-189481; FHWA/RD-81/153; T-CSGCP-004) Avail: NTIS HC A10/MF A01 CSCL 13C

The placement of mass concrete under water using a tremie was studied. Areas investigated include: (1) mixture design of tremie concrete including the use of pozzolanic replacement of portions of the cement; (2) flow patterns and flow related characteristics of tremie placed concrete; (3) heat development and associated cracking problems for tremie concrete; (4) prediction of temperatures in massive tremie concrete placements; and (5) quality of tremie placed concrete. The tremie placement of a massive cofferdam seal for a pier of a major bridge and the tremie placement of a deep cutoff wall through an existing earthfill dam are examined. A recommended practice and a guide specification for massive tremie placements are provided. Basic principles of tremie placement, concrete materials and mixture design, temperature considerations, placement equipment, preplacement planning, placement procedures, and postplacement evaluation are outlined. GRA

N83-11374# Federal Highway Administration, Washington, D.C.
SENSING SYSTEMS FOR MEASURING MECHANICAL PROPERTIES IN GROUND MASSES. VOLUME I.: BORE HOLE SHEAR, EARTH SETTLEMENT, AND EARTH PENETROMETER PROBES Final Report
Nathaniel S. Fox Oct. 1981 167 p refs
(Contract DOT-FH-11-9362)
(PB82-190448; FHWA-RD-81-109) Avail: NTIS HC A08/MF A08 CSCL 08M

An analysis of three in situ testing methods for possible use in tunnel design in soft ground is presented. These three in situ testing methods, the Bore Hole Shear (BHS), Bore Hole Earth Settlement (BESA) and Bore Hole Electronic Earth Penetrometer (BEEP) are in various stages of refinement. All show promise as practical methods of obtaining soil engineering data in a bored hole. The BHS is presently in commercial production. The BEEP requires only additional instrument research design to become

manufacturable, and the BESA requires additional applied research and correlation testing prior to final design and manufacture.
Author

N83-11375# Technical Research Centre of Finland, Espoo. Concrete and Silicate Lab.
CORROSION OF REINFORCING STEELS AT CRACKS IN CONCRETE
Erkki Vesikari 1981 46 p
(PB82-306384; ISBN-951-38-1270-7; ISSN-0358-5077) Copyright. Avail: NTIS HC A03/MF A01 CSCL 13B

The extent of corrosion at cracks and the factors which have the greatest influence on corrosion of reinforcements of concrete bridges were studied. The corrosion grade of reinforcing steels at cracks was visually estimated and the depth and width of a corroded area was measured. The factors chosen to explain corrosion were: the age of a bridge, the thickness of a protective concrete cover, the crack width, the carbonation depth at crack and at uncracked concrete surfaces, the pH value of concrete in the vicinity of reinforcements as well as the strength and chloride content of concrete. The correlation of the corrosion grade with the pH and chloride content of concrete was indicated. The corrosion grade was also proved to be dependent on the difference between the thickness of the protective concrete cover and depth of the carbonated zone at the crack. GRA

N83-11376# National Building Research Inst., Pretoria (South Africa).
THERMAL BEHAVIOR OF BUILDINGS AND THE ROLE OF COMPUTERS IN ENERGY CONSERVATION
P. P. Oliver 1981 21 p
(PB82-186453) Avail: NTIS HC A02/MF A01 CSCL 13A

The interrelationship between the climate, building design and energy consumption are considered and, the use of the digital computer to evaluate the potential of different energy conservation measures in buildings is discussed. GRA

N83-11377# Energy and Environmental Research Corp., Santa Ana, Calif
DEVELOPMENT OF CRITERIA FOR EXTENSION OF APPLICABILITY OF LOW-EMISSION, HIGH-EFFICIENCY COAL BURNERS Annual Report, Oct. 1979 - Oct. 1980
W. Nurick, R. Payne, J. Lee, P. Case, S. Chen, and D. Pershing Oct. 1981 202 p
(Contract EPA-68-02-2667)
(PB82-197153; EPA-600/7-81-171c; QR-3) Avail: NTIS HC A10/MF A01 CSCL 13A

A program to develop criteria for extending the applicability of low emission, high efficiency coal burners is described. For the small scale fuel studies, 28 coals covering all ranks were tested under a wide variety of conditions to ascertain the impact of coal properties on the fate of fuel nitrogen (N). Significant accomplishments in this part of the program include: (1) bench scale test results confirm the pilot scale concept that decreasing the initial air/fuel ratio decreases fuel NOx formation; (2) detailed studies on optimizing a staged combustion system suggest that the stoichiometry producing minimum NOx emissions is a function of both fuel composition and primary zone conditions; (3) distribution of the total fixed nitrogen (TFN) species--NO, NH3, and HCN--leaving the first stage strongly dependent on coal composition; (4) distribution of the first stage fuel N emissions has a significant impact on second stage exhaust NO emissions (minimum second stage NO emissions depend on competition between first stage NO and increased gas and solid phase N species); and (5) during staged combustion, increasing the rate of heat extraction from the first stage (fuel rich zone) decreases the decay of TFN species, but dramatically decreases TFN conversion in the second stage (first stage extraction reduces exhaust NO emissions). GRA

N83-11378# Honeywell Corporate Technology Center, Bloomington, Minn.
SPACE CONDITIONING PERFORMANCE ANALYSIS AND SIMULATION STUDY Annual Report, Feb. 1980 - Feb. 1981
A. Patani and U. Bonne Chicago GRI Jul. 1981 153 p refs
(Contract GRI-5014-341-0144)
(PB82-199001; GRI-80/0119) Avail: NTIS HC A08/MF A01 CSCL 13A

The engine driven heat pump model was expanded to incorporate an approach for evaluating the influence of cycling and systems included the sensitivity of performance to electric consumption, compressor speed, mixing, and climate. A modular program for evaluating the steady state performance of absorption heat pumps was developed. Initial simulations indicated performance trends as a function of outdoor temperature and the refrigerant absorber charge. The combustion heating system model, HFLAME, was used to simulate the benefits of fan/pump overrun and the dependence of corresponding setpoints on off period losses and electric costs. Benefits of fuel, fuel/air modulation as compared to cyclic performance were also analyzed. An energy distribution factor was defined to describe the effect of the distribution system on realizing savings of retrofits. Author

N83-11379# Illinois Univ., Urbana-Champaign. Engineering Experiment Station.
TIME-DEPENDENT DEFORMATION IN SEGMENTAL PRESTRESSED CONCRETE BRIDGES Interim Report, Jun. 1978 - Jan. 1981
Vernon Marshall and William L. Gamble Oct. 1981 254 p refs
(PB82-184037; FHWA/IL/UI-192; UILU-ENG-81-2014; SRS-495)
Avail: NTIS HC A12/MF A01 CSCL 13B

A rational analytical procedure for estimating the time dependent behavior of segmental prestressed concrete bridges built by the cantilever method is presented. It is based on a step by step numerical procedure which attempts to account for most of the important parameters that influence the time dependent behavior of such structures, and the procedure was incorporated in a computer program. Computed strains were compared with Kishwaukee River Bridge at Rockford, Illinois. Good agreement between the two sets of values was obtained as long as the computations were based on the creep properties of samples of concrete from the bridge, for the particular case where the creep specimens were stored outdoors in the same environment that the structure experienced. Author

N83-11380# Oregon State Univ., Corvallis. Dept. of Civil Engineering.
IMPACT OF VARIATION IN MATERIALS PROPERTIES ON ASPHALT PAVEMENT LIFE. EVALUATION OF A QUESTIONNAIRE Interim Report
Richard M. Moore (Oregon Inst. of Technology), James E. Wilson (Oregon Dept. of Transportation), Joe P. Mahoney (Washington Univ.), and R. G. Hicks May 1981 119 p Sponsored in part by Oregon Dept. of Transportation, and Federal Highway Administration
(PB82-196635; TE-81-5; FHWA/OR-81/3) Avail: NTIS HC A06/MF A01 CSCL 13C

In an effort to collect information on the status of quality control procedures and the use of pay adjustment factors, a questionnaire was distributed to all state agencies, the District of Columbia, and the Federal Highway Administration. Each agency was asked to respond to questions describing their current method for acceptance or rejection of asphalt concrete paving materials and related pay adjustment factors. The results of the questionnaire are summarized. Analysis of results indicate that most state agencies will accept one or more property characteristics of asphalt concrete that are outside specification tolerances. Most state agencies apply a pay adjustment factor to accepted materials which are outside specification tolerances. Only 26 percent of the state agencies consider their pay factors to be proportional to reduced pavement serviceability. Approximately one-half of the agencies consider the use of pay factor plans as effective in encouraging compliance with specifications. There is a wide disparity in the pay adjustment factors used by the different agencies. GRA

N83-11381# Pennsylvania Dept. of Transportation, Harrisburg. Materials and Testing Div.

HEAVY DUTY MEMBRANES FOR THE REDUCTION OF REFLECTIVE CRACKING IN BITUMINOUS CONCRETE OVERLAYS Construction Report, Apr. - Sep. 1981

Norman E. Knight and Gary L. Hoffman Oct. 1981 58 p Sponsored by Federal Highway Administration

(PB82-199928; HPR-79-6; FHWA/PA/RD-79/6) Avail: NTIS HC A04/MF A01 CSCL 13C

The prevalence of reflective cracking in asphaltic concrete overlays is a major factor contributing to the premature failure of the pavement system. This reflective cracking is caused by cyclic stresses induced in the overlay by movements in the underlying pavement. Seven different types of heavy-duty membranes were placed over Portland cement concrete pavement joints at one site in Pennsylvania before the roadway was overlayed with asphaltic concrete in order to evaluate the ability of these membranes to reduce the occurrence of reflective cracking over transverse and longitudinal joints and to function as a waterstop once cracking has occurred. Control joints without any membranes were also built into the project for comparison purposes. A.R.H.

N83-11382# Purdue Univ., Lafayette, Ind.

A LABORATORY INVESTIGATION ON THE USE OF FRAMED ASPHALT FOR RECYCLED BITUMINOUS PAVEMENTS Interim Report

Michael Brennan 17 Mar. 1981 50 p refs Sponsored in part by Indiana State Highway Commission and Federal Highway Administration

(PB82-199100; FHWA/IN/JHRP-81/5) Avail: NTIS HC A03/MF A01 CSCL 13C

The foaming characteristics of a selection of asphalts commonly used in construction in Indiana were recorded in terms of expansion ratio and half life. The performance of three of these asphalts as binders for a recycled bituminous paving mixture was evaluated using: (1) the Gyratory and the Marshall Compactive methods; (2) the Marshall stability testing procedure; and (3) the Hveem stability testing procedure. The effect of curing time and moisture on the stability of a recycled mix was also determined. A foaming temperature of 160 C (325 F) and an added water content of 2% were selected as the best conditions for optimum foam volume and half life. Excellent Marshall stability values were obtained with 0.5% and 1.0% foamed asphalt added to the recycled mixtures. Curing time had a marked effect on the lower additions of foamed asphalt. The effect of water decreases with increased amounts of foamed asphalt. Comparison of the Marshall Stability values and the Hveem Stability values indicates that the same optimum percent of foamed asphalt was obtained. A.R.H.

N83-11383# Soil Systems, Inc., Marietta, Ga.

SENSING SYSTEMS FOR MEASURING MECHANICAL PROPERTIES IN GROUND MASSES. VOLUME 1: BORE HOLE SHEAR EARTH SETTLEMENT AND EARTH PENETROMETER PROBES

Nathaniel S. Fox Oct. 1981 168 p refs

(Contract DOT-FH-11-9362)

(PB82-195926; FHWA/RD-81/10) Avail: NTIS HC A08/MF A01 CSCL 08M

An analysis of three in situ testing methods for possible use in tunnel design in soft ground is discussed. These three in situ testing methods, the Bore Hole Shear (BHS), Bore Hole Earth Settlement (BESA) and Bore Hole Electronic Earth Pentrometer (BEEP) are in various stages of refinement. All show promise as practical methods of obtaining soil engineering data in a bored hole. The BHS is presently in commercial production. The BEEP requires only additional instrument research design to become manufacturable, and the BESA requires additional applied research and correlation testing prior to final design and manufacture. GRA

N83-11384# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

FIRE TECHNOLOGY ABSTRACTS, VOLUME 4, ISSUE 1, AUGUST, 1981

L. J. Holtschlag, ed., B. W. Kuvshinoff, ed., and J. B. Jernigan, ed. Washington Federal Emergency Management Agency 1981 109 p refs

(PB82-210105; FEMA-02) Avail: NTIS HC A06/MF A01 CSCL 13L

This bibliography contains over 400 citations with abstracts addressing various aspects of fire technology. Subjects cover the dynamics of fire, behavior and properties of materials, fire modeling and test burns, fire protection, fire safety, fire service organization, apparatus and equipment, fire prevention, suppression, planning, human behavior, medical problems, codes and standards, hazard identification, safe handling of materials, insurance, economics of loss and prevention, and more. M.G.

N83-11385# Federal Emergency Management Agency, Washington, D.C. Data Dissemination and Use Div.

FIRE TECHNOLOGY ABSTRACTS, VOLUME 4. CUMULATIVE INDEXES

Mar. 1982 57 p

(PB82-219080) Avail: NTIS HC A04/MF A01 CSCL 13L

Cumulative subject, author, publisher, and report number indexes referencing articles, books, reports, and patents are provided. The dynamics of fire, behavior and properties of materials, fire modeling and test burns, fire protection, fire safety, fire service organization, apparatus and equipment, fire prevention suppression, planning, human behavior, medical problems, codes and standards, hazard identification, safe handling of materials, and insurance economics of loss and prevention are among the subjects covered. Author (GRA)

N83-11386# Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.

PERMANENT DEFORMATION IN FLEXIBLE PAVEMENTS M.S. Thesis

T. S. ChandraSeknaraRao Jun. 1981 178 p refs

(PB82-192402) Avail: NTIS HC A09/MF A01 CSCL 13B

The state of art was examined as an aid in developing an analytical tool to determine stresses in flexible pavements. An experimental set up for conducting the repeated load test on soil specimens under triaxial stress condition is discussed. Author

N83-11387# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.

FLEXIBLE SLEEVED PILE FOUNDATIONS FOR ASEISMIC DESIGN Final Report

John M. Biggs Mar. 1982 74 p refs

(Grant NSF PFR-79-02989)

(PB82-215724; WSF-CEE-82005) Avail: NTIS HC A04/MF A01 CSCL 13M

The feasibility of constructing buildings on horizontally flexible foundations to mitigate the effects of earthquakes is investigated. The flexibility is achieved by inserting a soft spring between the building superstructure and the soil foundation. The use of slender piles enclosed in sleeves is found to permit flexural distortion. The piles are designed by a simple procedure using smoothed response spectra. The performance of building-foundation systems so designed are then studied using histories of actual ground motions. It is shown that the simple design procedure is adequate and that the concept achieves the desired result of greatly reducing seismic forces. The maximum seismic forces on the building may be reduced to a level which is so low that the forces probably do not affect the design of the superstructure. The economic feasibility of the concept is analyzed and it is shown that the additional foundation cost can be justified on the basis of savings in initial superstructure cost and in probable future damage costs. GRA

N83-11388# National Bureau of Standards, Washington, D.C. Experimental Technology Incentives Program.

INTERNAL OFFSETS AND TECHNOLOGICAL INNOVATION: SIX CASE STUDIES, VOLUME 9

Mary Ellen Mogee Apr. 1982 73 p refs

(PB82-208372; NBSIR-82-2475) Avail: NTIS HC A04/MF A01 CSCL 13B

The experiences of six industrial firms with the new Federal policy of internal offsets are described. Offsets, regulatory reforms initiated by the Environmental Protection Agency and called by

the generic title of emission trading, were introduced to allow continued economic growth in nonattainment areas and to stimulate innovation in pollution control and process technology by making it profitable for firms to create more reductions than the law now requires. The problems of defining and measuring innovation as well as presenting industrial firm perceptions of innovaton associated with offset cases are discussed. Author

N83-11389# Maine Dept. of Transportation, Bangor. Materials and Research Div.
DYNAMIC PAVEMENT DEFLECTION Final Report
David W. Rand and Kenneth M. Jacobs Jun. 1981 57 p refs Sponsored by Federal Highway Administration
(PB82-194879; FHWA/ME/TP-81/06) Avail: NTIS HC A04/MF A01 CSCL 13B

Dynamic pavement deflection measurements for bituminous concrete pavements of two and three-quarter, five and seven-eights, and seven and one-half inches in thickness under moving axle loads of 15,000, 18,000, and 22,000 pounds were obtained at speeds of 10, 25 and 45 miles per hour. The results were analyzed and compared to Benkelman beam measurements. The data indicate that slow moving loads have greater adverse effect (larger deflections) on the pavement than the high speed loads. The results also show that the bituminous pavement undergoes numerous vertical fluctuations and bending as the front and rear axles approached the point of measurement. The magnitude of the vertical displacement was measured via the means of an accelerometer and double integrator. When values of the dynamic deflections were in the magnitude of 0.07 through 0.10 inches, there was evidence of pavement failure. When the deflection values were above 0.10 inches pavement failures were distinct. Author

N83-11390# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
IMAGE PROCESSING TECHNIQUES
May 1982 233 p refs Lecture held in Athens, 14-15 Jun. 1982; Paris, 17-18 Jun. 1982 and the Hague, 21-22 Jun. 1982 Original document contains color illustrations
(AGARD-LS-119; ISBN-92-835-1425-4) Avail: NTIS HC A11/MF A01

Image processing techniques, the human visual system, digital imagery and display, image generation and display, picture formatting and hardware considerations, image processing system design and implementation, image transmission and coding, feature extraction, optical information processing, and remotely sensed phenomena are discussed. For individual titles, see N83-11391 through N83-11400.

N83-11391# Rensselaer Polytechnic Inst., Troy, N. Y. Electrical, Computer, and Systems Engineering.
IMAGE PROCESSING TECHNIQUES c32
Lester A. Gerhardt *In* AGARD Image Process. Tech. May 1982 5 p (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

Image generation, image processing, image transmission, image enhancement, and interpretation are discussed. Author

N83-11392# Twente Univ. of Technology, Enschede (Netherlands). Dept. of Electrical Engineering.
THE HUMAN VISUAL SYSTEM c52
D. Bosman *In* AGARD Image Process. Tech. May 1982 22 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

The psycho-physical limits of performance are determined by the physical stimulus values at which there is 50% probability of detection: thresholds of the visual channel. Such visual characteristics are discussed. Author

N83-11393# Twente Univ. of Technology, Enschede (Netherlands). Dept. of Electrical Engineering.
FUNDAMENTALS OF DIGITAL IMAGERY AND DISPLAY c32
D. Bosman *In* AGARD Image Process. Tech. May 1982 21 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

Images are two dimensional distributions of luminance L(x,y) wherein x and y are the spatial (distance) coordinates of the local luminance L. They can be represented by landscapes with plains for uniform gray patches, slopes and hills for luminance gradients, towers and pits for speckles and dots, walls and canals for lines and vectors, and so on. The spatial resolution required for faithful reproduction of the image is determined by very steep luminance gradients and small radii in curvature of contours, and by just noticeable differences (JND's) in low gradients. The required luminance resolution is determined by discernible luminance contrasts. The spatial resolution depends on the luminance contrast. In the luminance ranges of displays, one may assume that most operations are linear. Author

N83-11394# Royal Signals and Radar Establishment, Malvern (England).
IMAGE GENERATION AND DISPLAY c06
T. R. Berry *In* AGARD Image Process. Tech. May 1982 25 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

The various scanning patterns used by conventional airborne sensors and the implications of displaying the data generated by them on a cockpit display based on commercial interlaced TV are reviewed. The challenge posed by flat panel displays to the dominance of the CRT in the TV field is considered briefly, and the relative merits of photographic film and magnetic tape as a means of providing a permanent record of the displayed data are explored. Author

N83-11395# Royal Signals and Radar Establishment, Malvern (England).
PICTURE FORMATTING AND HARDWARE CONSIDERATIONS c35
T. R. Berry *In* AGARD Image Process. Tech. May 1982 21 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

The basic requirements of an airborne Digital Scan Converter are explored, and the major design criteria established. Techniques for applying coordinate conversion are discussed in some detail, and two forms of polar to cartesian transformation compared. The effects of platform motion and the scanning mechanism of the sensors on the displayed imagery are considered and illustrated using simple examples. A distinction is made between real and off line viewing, and typical viewing times for various airborne sensors are determined. Author

N83-11396# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. Fuer Optoelektronik.
DFVLR'S DIBIAS, DESIGN AND IMPLEMENTATION OF A DIGITAL INTERACTIVE IMAGE PROCESSING SYSTEM c35
Klaus A. Ulbricht *In* AGARD Image Process. Tech. May 1982 12 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

The basic philosophy, as well as design considerations, of an interactive versus an automatic digital image processing system are discussed at the implementation of the Digital Interactive Bavarian Image Analysis System (DIBIAS). Its peripheral hardware and software are documented, and applications in the visible and near infrared part of the spectrum with fundamental programs on geologic and hydrologic topics are demonstrated. A short review of image processing possibilities is added. Author

N83-11397# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
DIGITAL IMAGE TRANSMISSION AND CODING c32
J. W. Modestino (California Univ. at San Diego, La Jolla) *In* AGARD Image Process. Tech. May 1982 8 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

A survey is provided of digital processing techniques for the coding, transmission and remote reconstruction of imagery data.

The coding techniques considered include PCM, DPCM, and its logical extension tree coding, as well as block transform techniques. Particular emphasis is given to the effects of channel errors on each of these techniques, as well as techniques for combatting these effects. Combined source channel coding approaches which have proven particularly effective in optimizing image reconstruction quality subject to a constraint on the overall transmission bandwidth are considered. Author

N83-11398# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
DIGITAL IMAGE PROCESSING WITH APPLICATIONS TO FEATURE EXTRACTION **c32**
J. W. Modestino (California Univ. at San Diego, La Jolla) *In* AGARD Image Process. Tech. May 1982 11 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

Digital image processing techniques are surveyed in the context of an overall image processing system characterized by extensive use of feature extraction for subsequent object detection and/or classification. This overall system is described in some detail identifying functional processing blocks. This is followed by discussion of various approaches to implementing each of these functional processing blocks. Emphasis is placed upon stochastic modeling assumptions and subsequent development of model based processing algorithms. Author

N83-11399# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
OPTICAL INFORMATION PROCESSING **c74**
H. Stark *In* AGARD Image Processing Tech. May 1982 11 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

An overview of optical information processing is presented. The emphasis is on coherent optical systems since they allow a broader range of image processing manipulations than incoherent ones. The Fourier transform property of a lens is discussed. How this property can be used in a linear system to filter images is shown. The Vander Lugt technique for constructing a complex spatial filter is reviewed and its application to image enhancement, pattern recognition, noise smoothing, phase object visualization and other problems is illustrated. Author

N83-11400# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. Fuer Optoelektronik.
IMAGE PROCESSING OF REMOTELY SENSED PHENOMENA **c43**
Klaus A. Ulbricht *In* AGARD Image Process. Tech. May 1982 18 p refs Original document contains color illustrations (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

A review of application possibilities of digital image processing of remotely sensed phenomena of the Earth is given. Several application examples processed on DIBIAS and representing different disciplines are discussed, showing possibilities of image processing. Among them are geologic, oceanographic, and cartographic examples, as well as applications in the field of atmospheric physics, correlation of SEASAT SAR to a LANDSAT scene, and an evaluation of a commercial compression algorithm. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-11401 Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
TERMINOLOGY OF RADAR TECHNIQUES
E. Hanle 5 Aug. 1981 50 p In GERMAN; ENGLISH summary (FFM-269-b) Copyright. Avail: Issuing Activity

A draft of the German standard on radar terms is presented and recommended for application. The terms are valid for primary radars. Special secondary radar terms are summarized in a separate section. Most of the terms are also used in sonar and lidar techniques. Author (ESA)

N83-11402 National Physical Lab., Teddington (England). Div. of Electrical Science.
DESIGN AND EVALUATION OF ANTENNAE FOR ECE MEASUREMENTS ON JET
E. A. M. Baker and A. E. Costley Jul. 1982 78 p refs
(Contracts AGMT-CUL-273; JB1/0131)
(NPL-DES-74; ISSN-0143-7305) Copyright. Avail: Issuing Activity

Antenna design principles for ECE measurements are outlined and two antennas for spatial scan ECE diagnostic on JET are described. The antenna design is based on diffraction optics of a rectangular horn operating in its fundamental mode. One antenna was optimized for measurements of the fundamental ECE harmonic in the o mode, the other for the second ECE harmonic in the e mode. Spatial resolution of copper prototypes, tested at frequencies from 70 to 130 GHz, is satisfactory. Polarization scrambling is < 0.5 %, with transmission > 85 %. Optimal spatial resolution is only achieved when the system is aligned to within + or - 5 deg. Author (ESA)

N83-11403# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SPECIFICATIONS FOR A LOW CAPACITY SINGLE CHANNEL PER CARRIER (SCPC) FM (6 TO 4 GHz) EARTH STATION [ESPECIFICACOES DE UMA ESTACAO TERRENA SCPC FM DE BAIXA CAPACIDADE PARA 6/4 GHZ]
Janio Kono, Naila Hoelz Colla, and Yumiko Arakaki Oct. 1981 46 p refs In PORTUGUESE; ENGLISH summary
(INPE-2254-NTE/178) Avail: NTIS HC A03/MF A01

Specifications are presented for a small-size and low-capacity Earth station for telephony, the laboratory prototype of which is being developed by INPE. Using 6 GHz and 4 GHz frequency bands, ground station is to be employed in a satellite communication network. This network will use frequency division multiple access (FDMA) with single channel per carrier (SCPC), frequency modulation (FM) and voice actived carriers. The Earth station specifications are divided into common equipment specifications and channel equipment specifications. Author

N83-11404# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DETERMINATION OF THE RADIATION DIAGRAM OF REFLECTING ANTENNAS USING THE ASYMPTOTIC PHYSICAL OPTICS METHOD [DETERMINACAO DO DIAGRAMA DE RADIACAO DE ANTENAS REFLETORAS USANDO O METODO DA OPTICA DISICA ASSINTOTICA]
Carlos Alberto Iennaco Miranda and Carlos Eduardo Santana Apr. 1982 44 p refs In PORTUGUESE; ENGLISH summary
(INPE-2383-RPE/411) Avail: NTIS HC A03/MF A01

The field scattered by a general surface of revolution, when illuminated with linearly, circularly, or elliptically polarized feeds, can be calculated by the physical optics method, which consists of the integration of the currents induced in the reflector surface. Generally, the field integrals cannot be carried out analytically and it is necessary to use numerical methods. By the asymptotic physical optics method, the integrals that yield the scattered field can be evaluated analytically by the method of stationary phase. Radiation patherns were obtained for parabolic and hyperbolic surfaces, using the formulation developed in both cases. It is found that with the asymptotic physical optics method, there is an appreciable reduction in the processing time it takes for the calculation of the radiated field. For large reflectors, it is advantageous to use the approximation of the physical optics, since it

yields the radiation patherns with good accuracy when compared to the full physical optics solution. Author

N83-11405# National Aeronautical Lab., Bangalore (India).
A GaAs LASER VOICE COMMUNICATOR
H. Leelavathi, V. M. Veeraraghavalu, K. Subrahmanyam, and J. P. Pichamuthu Aug. 1981 55 p refs
(NAL-TN/51) Avail: NTIS HC A04/MF A01

The design and construction of a half duplex laser communicator for use over short distances through line of sight atmospheric paths is described. The capabilities and limitations of optical communication systems are discussed. Topics covered include: the design of the optical transmitter using the GaAs laser as the source; encoding the voice signal to suit the optical transmitter; the adaptive delta modulation circuit; the different types of photodetectors suitable for an optical receiver including an optical receiver designed around a Silicon PIN photodiode and the method of recovery of the clock frequency from the received digital pulse stream. The complete transceiver system comprising the transmitter, encoder and the receiver is described. The tests performed on the complete system using an audio signal and an actual signal over a 5 meter test path are outlined. The performance of the system is evaluated with photographs of the received and the transmitted signal. The S/N of the system is also calculated for an audio signal of frequency 800 Hz. Possible applications of the present system are discussed and suggestions made for future developments. A.R.H.

N83-11406*# National Aeronautics and Space Administration, Washington, D. C.
COMMUNICATIONS SATELLITE NO. 2 (CS-2)
Oct. 1982 69 p Transl. into ENGLISH of Japanese rept. "Tsushin Eisei 2 Go" Tokyo, 1982 p 1-49 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Commun. and Broadcasting Satellites Organ. (Japan)
(Contract NASw-3542)
(NASA-TM-76950; NAS 1.15:76950) Avail: NTIS HC A04/MF A0I CSCL 17B

The purpose of the Japanese CS-2 satellite is to provide national communications and industrial communications, such as special emergency and remote communications, and to contribute to the development of technology pertaining to communications satellites. Description and operating parameters of the following satellite components are presented: structure, communications system, telemetry/command system, electric power system, attitude and antenna control system, secondary propulsion system, apogee motor, framework, and heat control system. Author

N83-11407# Electromagnetic Compatibility Analysis Center, Annapolis, Md.
AN INITIAL CRITICAL SUMMARY OF MODELS FOR PREDICTING THE ATTENUATION OF RADIO WAVES BY TREES Final Report
Mark A. Weissberger (IIT Research Inst., Annapolis, Md.) Jul. 1982 165 p refs
(Contract F19628-80-C-0042)
(AD-A118343; ESD-TR-81-101) Avail: NTIS HC A08/MF A01 CSCL 20/14

This report is a review of models and data that can be used to predict the increase in attenuation due to trees and underbrush that are located between a radio transmitter and receiver. Applications in the 3 MHz to 95 GHz band are addressed with emphasis placed on the 200 to 9200 MHz range. It is shown that the conventional technique for predicting the loss caused by propagation through a small grove of trees is often substantially in error. An improved empirical model is developed to mitigate the problem; a physical justification for the model is presented. Author (GRA)

N83-11408# Massachusetts Inst. of Tech., Cambridge.
MULTI-DIMENSIONAL SIGNAL PROCESSING RESEARCH PROGRAM Semiannual Technical Summary Report, 1 Oct. 1981 - 31 Mar. 1982
Dan E. Dudgeon 31 Mar. 1982 49 p refs
(Contract F19628-80-C-0002)
(AD-A118186; ESD-TR-82-041) Avail: NTIS HC A03/MF A01 CSCL 17/2

This Semiannual Technical Summary covers the period 1 October 1981 through 31 March 1982. It describes the significant results of the Lincoln Laboratory Multi-Dimensional Signal Processing Research Program sponsored by the Rome Air Development Center, in the areas of image segmentation, classification, target detection, and adaptive contrast enhancement. Author (GRA)

N83-11409# Illinois Univ., Urbana. Electromagnetics Lab.
ANALYSIS OF FIN-LINE AT MILLIMETER WAVELENGTHS Interim Technical Report
J. S. Wilson and R. Mittra Jul. 1982 56 p refs
(Contract DAAG29-82-K-0084)
(AD-A118112; UIEM-82-6; UILU-ENG-82-2545; ARO-18054.2-EL) Avail: NTIS HC A04/MF A01 CSCL 09/1

An analysis of fin-line is presented along with numerical and experimental results. Dispersion characteristics and field distributions are given for a number of single-mode and multi-mode configurations. Agreement between theory and experiment is shown to be quite good. Author (GRA)

N83-11410# Naval Research Lab., Washington, D. C.
EFFECT OF THE IONOSPHERE ON RADIOWAVE SYSTEMS
John M. Goodman, ed. 1981 708 p refs Presented at the Ionospheric Effects Symp., Alexandria, Va., 14-16 Apr. 1981 Sponsored in part by AFGL
(AD-A118236) Avail: NTIS HC A99/MF A01 CSCL 20/14

IES '81 is the third Ionospheric Effects Symposium to be sponsored by the Naval Research Laboratory. The purpose of this symposium was to improve the information transfer between system architects, managers, and designers on the one hand, and ionospheric physicists and propagation specialists on the other hand. The conference itself covered various topics of current interest to the ionospheric research community. Session topics included the following: Ionospheric Modification, General Reviews and Total Electron Content, Equatorial Scintillation Studies, HF Propagation/Remote Sensing, High-Latitude Scintillation, Sub-HF Propagation and System Effects, Ionospheric and Propagation Models, and Future Plans and Programs. GRA

N83-11411# Office of Naval Research, London (England).
AREA REPORT: ANTENNA AND PROPAGATION RELATED WORK IN EUROPE AND ISRAEL
T. C. Cheston 10 Jun. 1982 14 p
(AD-A118224; ONRL-R-1-82) Avail: NTIS HC A02/MF A01 CSCL 09/5

This is a report of visits made by the author to universities, industrial and other technical establishments while serving as a liaison scientist at ONR London from October 1979 to October 1981. The report begins by highlighting the most important topics, then goes on to describe research in France, Israel, Italy, The Netherlands, Switzerland, Turkey, West Germany, and Yugoslavia. GRA

N83-11412# Naval Postgraduate School, Monterey, Calif.
RADAR MODEL WITH TERRAIN EFFECTS M.S. Thesis
James W. Meritt Mar. 1982 85 p refs
(AD-A118195) Avail: NTIS HC A05/MF A01 CSCL 17/9

This thesis presents a novel naval radar model which computes radar detection in the presence of land masses. The model is an interactive computer program which accepts scenarios and radar parameters from the user and displays a map of the area indicating where targets can and cannot be detected. The resulting map can be displayed at the user's computer terminal or printed offline. GRA

N83-11413# General Electric Co., Syracuse, N.Y.
RADAR HEIGHT BIAS ESTIMATION FOR A GROUND-BASED RADAR USING AN AIRCRAFT ALTIMETER AS A STANDARD OF REFERENCE

B. A. Deresh Jun. 1982 80 p refs
(AD-A118194; R82EMH3) Avail: NTIS HC A05/MF A01 CSCL 17/7

Buyers of modern Air Defense Radars usually specify bounds for the total root-mean-square (rms) errors of range, azimuth and height. These errors have bias and random (jitter and thermal) components which appear as summed variances. With a colocated precision track radar with known errors much smaller than the radar under test, the total rms error is established in a straightforward manner. For test sites without such a standard, the problem is more difficult. Such is the case for the majority of buyers of the GE-5923-D Air defense Radar. However, a standardized approach to this problem has emerged in which the bias and random errors are characterized separately, without the need for a colocated precision track radar. A method for making unbiased estimates of the variance of random errors has been developed and a paper is currently in preparation. This paper deals entirely with the characterization of radar height bias errors. GRA

N83-11414# M/A-COM LINKABIT, Inc., San Diego, Calif.
LOW-COST PACKET RADIO DECODERS Final Report
W. Allen Shumate 30 May 1982 177 p
(Contract MDA903-79-C-0190; ARPA Order 3479)
(AD-A118154) Avail: NTIS HC A09/MF A01 CSCL 17/2

This is the final report for the development of an LSI (Large Scale Integrated) Sequential Decoder Chip and an Interface Chip, the Direct Memory Access Interface, for use in the Low-Cost Packet Radio. The report describes each of the devices, the procedure used in development, and problems associated with each development. Additionally, the functional specifications for each device are included. These specifications cover the internal architecture and applications for each device. Author (GRA)

N83-11415# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS IN THE MATCHING OF AN ARRAY WITH OUTER SPACE
Lemanskiy, and A. Ye. Tumanskaya 9 Jul. 1982 5 p Transl. into ENGLISH from Nauch. Sessiya Posvyahchennaya dnyu Radio i dnyu Svyazista annotatsii i Tezisy Sleduyushchikh Annotatsii i Tezisy Sleduyushchikh Sekts. (USSR), v. 3, no. 3, 1972 p 97-98
(AD-A118335; FTD-ID(RS)T-0881-82) Avail: NTIS HC A02/MF A01 CSCL 09/5

Th problem of matching an array of plane waveguides with outer space is solved using a set of plane dielectric layers as an illustration of relationships obtained. Results of the solution of the problem of matching an array of plane waveguides using projecting dielectric plates are presented. GRA

N83-11416# JAYCOR, Alexandria, Va.
COMMENTS ON CHANNEL SIMULATION TECHNIQUES
S. L. Adams 25 May 1982 2 p
(Contract N00024-81-C-6288)
(AD-A118283; JAYCOR-J640-014-82-2242) Avail: NTIS HC A02/MF A01 CSCL 17/2

Several approaches to channel simulation have been discussed recently. This memorandum comments on their shortcomings relative to an ideal channel simulation. Author (GRA)

N83-11417# Naval Postgraduate School, Monterey, Calif.
A DISTRIBUTED ROUTING PROTOCOL FOR A PACKET RADIO NETWORK M.S. Thesis
Robert R. Heritsch Mar. 1982 168 p refs
(AD-A118271) Avail: NTIS HC A08/MF A01 CSCL 17/2

Packet Radio is a digital communications concept which offers the user the capability to pass voice and other data in a radio network which may link high power computers with small mobile radios containing microprocessors. The technique of routing digital traffic from source to destination depends on the operational requirements of the network. Most routing concepts today centralize network control (in varying degrees) for normal operations. GRA

N83-11418# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
PROBABILISTIC SOLUTION FOR ONE-DIMENSIONAL PLANE WAVE PROPAGATION IN HOMOGENEOUS BILINEAR HYSTERETIC MATERIALS Final Report
Behzad Rohani Jun. 1982 31 p refs
(AD-A118030; WES/MP/SL-82-7) Avail: NTIS HC A03/MF A01 CSCL 20/14

This paper describes the development of a probabilistic solution for stress wave propagation in homogeneous bilinear hysteretic materials subjected to an exponentially decaying surface airblast pulse. The partial derivative method is used to calculate the time histories of the moments of the dependent (output) variables, consisting of particle displacement, particle velocity, and stress, in terms of functions of moments of the independent (input) variables. The partial derivatives are evaluated numerically using finite-difference approximations. Several sensitivity analyses are conducted to illustrate how the solution technique can be used to quantify and rank the relative effects of input variabilities or uncertainties on the dispersion of output quantities. Finally, application of the methodology for conducting probabilistic analyses of airblast-induced vertical ground shock is demonstrated. GRA

N83-11419# Institute for Defense Analyses, Alexandria, Va. Science and Technology Div.
C3I DATA BASE AND NETWORKING ANALYSIS Final Report, Oct. 1980 - Nov. 1981
Thomas C. Bartee and Oscar P. Buneman Apr. 1982 92 p refs
(Contract MDA903-79-C-0320)
(AD-A118397; AD-E500518; IDA-P-1637; IDA/HQ-81-24138) Avail: NTIS HC A05/MF A01 CSCL 09/2

DoD networks support a large number of geographically dispersed data bases maintained under heterogeneous software environments. There is an urgent need to provide uniform and simple user access to these data bases, especially for Command and Control systems. This report studies the problems of implementing a network query language and the design of good user interfaces, especially for structurally complex data bases such as the Electronic Warfare Information System (EWIS). Software standards for future data base development are also discussed, especially the problem of adapting Ada to interface to existing data base systems. Further development of data base interfaces is required, and it is suggested that a test-bed be set up to support a selection of C3I data bases and to support this development. The geographic configurations and survivability requirements of DoD networks leads to overall configuration needs that are different from commercial networks. An analysis shows that distributed switches are preferable to a few large switches for a defense data network. Protocols and frontends are also discussed and a need for immediate action in these areas is established. GRA

N83-11420# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A GENERAL PURPOSE MINI-COMPUTER BASED DIGITAL SIGNAL PROCESSING LABORATORY M.S. Thesis
Wayne Todd Jun. 1982 174 p refs
(AD-A118066; AFIT/GE/EE/82J-14) Avail: NTIS HC A08/MF A01 CSCL 17/2

This project involved the integration of hardware and software to develop a general prupose digital signal processing (DSP) laboratory based on a Hewlett Packard (HP) 21MX-type computer. The hardware included an HP 2108A computer, HP 7906 disk drive, HP 2648A grpahics terminal, Texas Instruments Silent 700 printing terminal, Remex optical paper tape reader, two Analog Devices ADC-12QZ analog-to-digital converters, and an HP 12555B digital-to-analog converter. The operating system generated for the laboratory was RTE-III. It is the latest version of RTE that can be used with the currently available hardware. Software support for I/O devices not supported by RTE-III was developed and implemented. Four DSP applications programs were implemented and tested. GRA

N83-11421# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
RADAR WAVEFORM SELECTION BASED ON THE CALCULATION AND APPLICATION OF RADAR AMBIGUITY FUNCTIONS M.S. Thesis
John David Reed Jun. 1982 173 p refs
(AD-A118087; AFIT/GE/EE/82J-11) Avail: NTIS HC A08/MF A01 CSCL 17/9

The magnitude of the radar ambiguity function for commonly used radar waveforms is calculated and displayed in three-dimensional diagrams. The ambiguity functions are calculated as a function of range delay and Doppler frequency. For a specified clutter environment and a particular radar waveform, the signal-to-clutter ratio for a desired target is calculated. A method to select a radar waveform, given the desired target detection criteria and clutter environment, is derived. This method relies on the analysis of the magnitude of the ambiguity function, signal-to-clutter ratio, and other basic principles of radar theory. Author (GRA)

N83-11422# Computer Sciences Corp., Falls Church, Va.
BASE TRANSMISSION PATH TRADE-OFF ANALYSIS Final Report
L. Rousseau 30 Jun. 1982 390 p refs
(Contract F23613-77-D-0011)
(AD-A118326; CSC-TR-82-06-EZ) Avail: NTIS HC A13/MF A01 CSCL 17/2

The base transmission systems, existing in most Air Force locations today are composed of various size, age, quality, and quantity, of multiple paired cables. Expansion or changes to these systems are best accomplished in a planned, systematic way, taking maximum advantages of the various media and technologies currently available. Some considerations for effecting a planned approach to the base transmission systems include the knowledge of subscriber needs, future requirements, physical plant utilization, technology available, and cost for the various options available. This report provides information on some methodologies, design factors and cost trade-offs that can be analyzed to determine the optimum trade-off approach for a given set of transmission circumstances. Author (GRA)

N83-11423# Weather Wing (7th), Scott AFB, Ill. Aerospace Sciences Div.
RAY-TRACING ANALYSIS OF A LINE-OF-SIGHT COMMUNICATIONS PATH
James W. Goldey May 1982 28 p
(AD-A118432; AD-E850179; Rept-7WW/TN-82/001) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report describes a ray tracing technique used to examine possible causes of a line-of-sight microwave link between Feldberg and Adenau, West Germany during the winters of 1975-76 and 1976-77. Use of the technique with various model atmospheres helped determine the significance of refractive bending and the location of radio holes. Estimates of the depth of the resulting fades showed that, on the average, fade was not significant. Results showed that fade can be expected whenever surface-based trapping layers extend to 1800 feet MSL. Antenna decoupling, another possible source, was not examined in this study. GRA

N83-11424# Texas Instruments, Inc., Dallas.
VOICE VERIFICATION UPGRADE Final Technical Report, 12 May 1980 - 31 Dec. 1981
Robert L. Davis, James T. Sinnamon, and David L. Cox Griffiss AFB, N.Y. RADC Jun. 1982 246 p refs
(Contract F30602-79-C-0190; AF Proj. 681E)
(AD-A118444; TI-08-82-07; RADC-TR-82-139) Avail: NTIS HC A11/MF A01 CSCL 17/2

This contractor has two major objectives. The first was to build, test, and deliver to the government an entry control system using speaker verification (voice authentication) as the mechanism for verifying the user's claimed identity. This system included a physical mantrap, with an integral weight scale to prevent more than one user from gaining access with one verification (tailgating). The speaker verification part of the entry control system contained all the updates and embellishments to the algorithm that was developed earlier for the BISS (Base and Installation Security System) system under contract with the Electronic Systems Division of the USAF. These updates were tested prior to and during the contract on an operational system used at Texas Instruments in Dallas, Texas, for controlling entry to the Corporate Information Center (CIC). Author (GRA)

N83-11425# University of South Florida, Tampa. Dept. of Electrical Engineering.
NONLINEAR REPRESENTATION AND PULSE TESTING OF COMMUNICATION SUBSYSTEMS Final Report, 1 Nov. 1979 - 30 Sep. 1981
Vijay K. Jain and Aubrey M. Bush Griffiss AFB, N.Y. RADC May 1982 68 p refs
(Contract F30602-78-C-0120; AF Proj. 2338)
(AD-A118443; SS-39PULVOL; RADC-TR-82-138) Avail: NTIS HC A04/MF A01 CSCL 17/2

In this report we describe a method for determining the linear and quadratic subsystems from square-pulse tests. The identification method involves two transient test in the laboratory, followed by analysis by the computer. Advantages of the method include the rapidity of the laboratory tests, as contrasted with traditional frequency-scan approaches, and the explicit determination of the transfer functions. Furthermore, the method is also extendible to H3(s1,s2,s3). Author (GRA)

N83-11426# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ATTACKING PROBLEMS WITHOUT FEAR OF THE DIFFICULTIES
Li Tianjun 14 Jul. 1982 10 p Transl. into ENGLISH from Jierangjun Muabao (China), no. 7, 1979 p 28-29
(AD-A118184; FTD-ID(RS)T-0824-82) Avail: NTIS HC A02/MF A01 CSCL 17/2

Laser atmospheric transmission experiments were performed and the transmission characteristics of a CO2 laser were observed. As a result, a laser atmospheric communications device was developed. GRA

N83-11427# Los Alamos Scientific Lab., N. Mex.
CALCULATION OF ELECTROMAGNETIC FIELDS WITH VARIATION IN PHI AXISYMMETRIC CAVITIES. PART 1: BASIC RELATIONS. PART 2: POSSIBILITIES OF THE PRUD CODE
A. G. Daikovskii, Yu. I. Portugalow, and A. D. Raibov 1982 25 p refs
(Contract W-7405-eng-26)
(DE82-015446; LA-tr-82-22-Pt-1; LA-tr-82-22-Pt-2) Avail: NTIS HC A02/MF A01

Natural frequencies and their corresponding electromagnetic fields in axisymmetric cavities of an arbitrary shape are calculated. The method is based on the representation of the equations for electrodynamics in variables H sub phi, E sub phi. Approximation of the equations for a numerical solution of the problem is realized by the method of finite elements. DOE

N83-11428# Fondazione Ugo Bordoni, Rome (Italy).
GENERAL ANALYSIS OF MILLIMETRIC WAVE H GUIDES [ANALISI GENERALE DELLE GUIDE AD H A ONDE MILLIMETRICHE]
Paolo Bassi (Bologne Univ.), Gabriele Falciasecca (Bologne Univ.), and Giuseppe Savini (Bologne Univ.) Dec. 1981 63 p refs In ITALIAN
(FUB-33-1981) Avail: NTIS HC A04/MF A01

A mathematical model, describing the wave modes in an idealized H guide, is presented. The H guide is a dielectric plate limited by two parallel conducting surfaces of infinite extension. The wave propagation conditions, the attenuation coefficients, the dielectric losses and the conduction losses are abtained from a single parameter which is a function of the waveguide geometrical data. It is shown that the H guide performs efficiently at frequencies greater than the usable range of the traditional rectangular waveguides. It is suggested to employ LSM1 mode because of

lower attenuation than the LSE1 mode, and compatibility with rectangular guides. Author (ESA)

N83-11429# Trieste Univ. (Italy). Ist. de Elettrotec. e di Elettronica.

PROBLEMS RELATED TO THE USE OF COUPLED MODE EQUATIONS IN DIRECTIONAL COUPLER DESIGN FOR MILLIMETER WAVE OPEN STRUCTURES [PROBLEMI CONNESSI CON L'USO DELLE EQUAZIONE DEI MODI ACCOPIATI NEL PROGETTO DI ACCOPPIATORI DIREZIONALI TRA STRUTTURE APERTE AD ONDE MILLIMETRICHE]

Tullio Corzani (Trieste Univ., Italy), Gabriele Falciasecca (Bologne Univ.), Lucio Mania (Trieste Univ.), and Elvio Valentinuzzi Rome Fondiazione Ugo Bodoni Dec. 1981 27 p refs In ITALIAN
(FUB-34-1981; RIF-1B3781) Avail: NTIS HC A03/MF A01

Millimeter wave waveguides are characterized by open conductive surfaces and a discontinuity in the dielectric media. The application of coupled mode equations to the design of directional couplers involves the introduction of losses that may affect severely the mathematical model used for the design. Examples of a coupler anomalous performance are presented. A qualitative modification of the mathematical models is suggested and a procedure consisting of simultaneous discretization and introduction of losses is presented to bypass the design problem. Author (ESA)

N83-11430# AEG-Telefunken, Backnang (West Germany). Fachbereich Raumfahrt.

INVESTIGATION OF A DIGITAL SOUND SYSTEM Final Report, Jul. 1981

Gunter Gottschald, Sander Rasmussen, and Werner Schreitmueller Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 124 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-011; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26

A digital sound system is defined which allows transmission of 16 high quality stereophonic sound programs within a 27 MHz WARC channel. Reception is possible in an area which is substantially larger than that valid for television (TV) reception. A 14 bit linear quantization and a sampling rate of 32 kHz are used. Transmission performance is improved by application of a BCH code with a mixed decoder strategy of error correction and, respectively, error detection with subsequent interpolation. In order to restrict out-of-band emissions to values in compliance with WARC requirements, 4 phases QPSK modulation with coherent detection is used. The signal then is sufficently narrowband to be distributed within the 14 MHz band of the special channels S2 and S3 in cable TV distribution (CATV) installations. Some CATV interference problems are pointed out which need experimental verification. Author (ESA)

N83-11431# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.

A MULTI-LANGUAGE EVALUATION OF THE RASTI METHOD FOR ESTIMATING SPEECH INTELLIGIBILITY IN AUDITORIA

T. Houtgast and H. J. M. Steeneken Jan. 1982 40 p refs
(Contract G79-103)
(IZF-1981-12; TDCK-76164) Avail: NTIS HC A03/MF A01

The physical measure Rapid Speech Transmission Index (RASTI) was developed to assess speech intelligibility in auditoria. In order to evaluate this method, a set of 14 auditorium conditions (plus 2 replicas) with various degrees of reverberation and/or interfering noise were subjected to: (1) RASTI measurements; (2) articulation tests performed by laboratories in 11 different countries; and (3) additional quality rating experiment by 4 of these laboratories. The various listening experiments show substantial differences in the ranking of the 14 conditions. For instance, it appears that the absence of a carrier phrase in some of the articulation tests has great influence on the relative importance of reverberation as compared to noise interference. When considering only the tests which use an appropriate carrier phrase (7 countries), it is found that the RASTI values are in good agreement with the mean results of these articulation tests. Author (ESA)

N83-11432# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.

THE APPLICATION OF THE SPEECH TRANSMISSION INDEX (STI) METHOD TO TESTING DIGITAL TRANSMISSION CHANNELS

H. J. M. Steeneken and T. Houtgast Nov. 1981 13 p refs In DUTCH; ENGLISH summary
(Contract A79/KL/148)
(IZF-1981-22; TDCK-76165) Avail: NTIS HC A02/MF A01

An objective method of measuring the quality of speech transmission channels with respect to intelligibility was applied to digital channels in order to test whether the specific distortions present on such channels are accounted for correctly by the STI. The STI and PB word intelligibility were measured for a great number of PCM and delta modulation channels. Results show that the relation between STI and PB word intelligibility does not differ significantly from the results found in the case of analog channels. Author (ESA)

N83-11433# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.

SOME APPLICATIONS OF THE SPEECH TRANSMISSION INDEX (STI) IN AUDITORIA

H. J. M. Steeneken and T. Houtgast Feb. 1982 20 p refs
(IZF-1982-2; TDCK-76167) Avail: NTIS HC A02/MF A01

The use of an objective method of measuring speech intelligibility in auditoria is illustrated. The applications involve the mapping of iso-intelligibility contours for tracing areas with poor intelligibility, and also for assessing the gain of a public address system. The method, based on the modulation transfer function (MTF), presents valuable diagnostic information about the effect of reverberation, noise, echoes and of public address systems on intelligibility. The measuring time is about 3 minutes for the MTFs of the octave bands 500 Hz and 2000 Hz. Author (ESA)

N83-11434# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie en Technische Menshunde.

DESIGN OF MOBILE SHELTERS FOR COMMUNICATION PURPOSES

W. A. Lotens and H. J. Leebeek Mar. 1982 17 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/D23)
(IZF-1982-3; TDCK-76168) Avail: NTIS HC A02/MF A01

A general design for a future generation of shelters, to be used as mobile work places, is presented. Design criteria involve ergonomics, functional suitability, and air conditioning. Electronics, power supply, and personnel get their own compartments. Work space is provided for two people with room for two more. Center of mass and cable connections are considered. Air conditioning requirements are calculated with a computer program. The result is an integrated design, applicable to shelters for several purposes. Author (ESA)

N83-11435# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.

THE SOUND ATTENUATION AND SPEECH TRANSMISSION QUALITY OF THE HEADSETS H-133C/AIC AND 7HB AND OF THE MAXIGARP EARMUFF

A. M. Mimpen Apr. 1982 15 p In DUTCH; ENGLISH summary
(Contract A76/K/104)
(IZF-1982-8; TDCK-76387) Avail: NTIS HC A02/MF A01

Sound attenuation as a function of frequency was investigated with 10 subjects. Results show that for the lower frequencies the headset H-133C/AIC gives the highest attenuation. With respect to sound attenuation, the headset H-133C/AIC differs significantly from the headset 7HB, but not significantly from the Maxigard earmuff. Test results for speech transmission quality of the headsets show that the microphone in the mouth capsule of headset H-133C/AIC gives, in silence and in the presence of background noise, a higher speech transmission index (STI) than

the microphone of headset 7HB. Likewise, the telephone of headset H-133C/AIC gives a significantly higher STI than the telephone of the headset 7HB. Author (ESA)

N83-11436# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.
DEVELOPMENT AND EVALUATION OF A DUTCH DIAGNOSTIC RHYME TEST FOR ASSESSING THE INTELLIGIBILITY OF SPEECH COMMUNICATION CHANNELS
H. J. M. Steeneken Jun. 1982 30 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/017)
(IZF-1982-13; TDCK-76636) Avail: NTIS HC A03/MF A01

A subjective intelligibility measuring method, based on a two-alternative forced-choice test, was developed for the Dutch language. This test is comparable with the American Diagnostic Rhyme Test as developed by Voiers. The fundamentals and phonetic background of the Dutch implementation are given. The reproducibility and the relation to other intelligibility measures were studied for 40 different reference channels. The results show that the subjects need not be trained and that the measuring results are comparable with results obtained with phonetically balanced word lists. Author (ESA)

N83-11437# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.
PROJECT NOORDWIJK. PART 3: THE RADAR BACKSCATTER COEFFICIENT GAMMA AS MEASURED AT PLATFORM NOORDWIJK AND COMPARISON WITH OTHER DATA
G. P. deLoor May 1982 34 p refs
(PhL-1982-22; TDCK-76560) Avail: NTIS HC A03/MF A01

Measurements of the radar backscatter coefficient gamma (sigma deg) that were made at platform Noordwijk are analyzed and compared with other data. A fair agreement is found with the data that was obtained by other investigators who were working on this platform. The backscatter coefficient can now be given with a reasonable accuracy as a function of grazing angle and wind speed. Upwind/downwind results, respectively, upwind/crosswind and downwind/crosswind ratios, are given together with gamma sub vv/gamma sug hh for the wind directions.
Author (ESA)

N83-11438# Physics Lab. RVO-TNO, The Hague (Netherlands).
INVERSE SYNTHETIC APERTURE RADAR: PRELIMINARY RESULTS
K. K. Eerland Jun. 1982 51 p refs
(PhL-1982-32; TDCK-76714) Avail: NTIS HC A04/MF A01

Theory and results of simulations, associated with inverse synthetic aperture radar (ISAR) imaging are discussed. A radar signal processing algorithm was developed which derives an ISAR image of an aircraft model. This algorithm assumes a straight unaccelerated flight path and an accurate measurement of the flight path parameters in order to perform proper imaging. However, in practice an aircraft may be maneuvering during the observation and also some flight path parameters may be measured inaccurately. In order to compensate for the two most frequent disturbing effects, the algorithm makes use of two specific correction methods. First, a measurement error in the target velocity is removed by means of an optimization procedure and, secondly, a compensation for a curved flight path is performed. Attention is also given to the influence of observation noise. The noise is assumed to be stationary, Gaussian and white (a uniform spectrum). Author (ESA)

N83-11439# Ohio State Univ., Columbus. Wave Propagation Group.
MULTIPLE SCATTERING OF ELECTROMAGNETIC WAVES IN PRECIPITATION FILLED MEDIA Final Report, Sep. 1978 - Sep. 1981
V. K. Varadan, V. N. Bringi, V. V. Varadan, and T. A. Seliga Dec. 1981 245 p refs
(Grant NOAA-04-78-B01-21)
(PB82-188996; NOAA-82021910) Avail: NTIS HC A11/MF A01 CSCL 20N

The effect of multiple scattering on the coherent wave attenuation through precipitation was investigated. The precipitation media is modelled as a random distribution of identical, spherical water or ice particles. The first and second order probability distribution functions are specified and a self-consistent T-matrix approach together with Lax's quasi-crystalline approximation is used to derive dispersion equations whose singular solutions yield the complex propagation constant of the "effective" medium. The resultant attenuation is due to both absorption and scattering. The scattering component depends on frequency, volume concentration (c) and the assumed form for the pair-correlation function of the scatterers. The publications resulting from the investigations are appended.
Author

N83-11440# National Telecommunications and Information Administration, Boulder, Colo.
MOLECULAR ABSORPTION TEST AT 35 GHz
Hans J. Liebe Feb. 1982 50 p refs Sponsored by the DNA
(PB82-189937; NTIA-82-96; NTIA-ITS3.4) Avail: NTIS HC A03/MF A01 CSCL 20N

A laboratory experiment is described which was conducted to find out if the absolute attenuation of a 35 GHz signal by the molecular species hydrogen peroxide, nitric acid, nitrogen dioxide, and nitrous oxide exceeds a threshold value of 0.2 dB/km for concentrations reaching 500 ppm/vol in 1 atm of air. A resonance spectrometer was operated with a detection sensitivity of 0.1 dB/km to obtain pressure scans of attenuation and refraction for the pure gases at low pressures (<1 kPa) and for bindary mixtures at atmospheric pressures (> 50 kPa) using nitrogen as the inert, loss-free host gas. Model calculations of attenuation over the frequency range 10 to 50 GHz were performed for natural moist air and hot air (< or = 500 K) under sea level conditions. The measurements of the identified trace gas species produced little (i.e., > 0.2 dB/km) additional attenuation. M.G.

N83-11441# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
DIGITAL SYSTEM PERFORMANCE SOFTWARE UTILIZING NOISE MEASUREMENT DATA
A. D. Spaulding Feb. 1982 41 p refs
(PB82-187188; NTIA-82-95) Avail: NTIS HC A03/MF A01 CSCL 17B

Techniques that use the measured instantaneous envelope statistics of arbitrary noise or interference processes to calculate the degradation these processes cause to digital communication systems are summarized. Computer implementation of the techniques are also given. The computer algorithms are designed for the data obtained from a general purpose noise measurement device, termed the DM-4. Two noise examples are used, one for narrowband interference, and one for broadband interference.
GRA

N83-11442# National Telecommunications and Information Administration, Boulder, Colo.
A SIMPLIFIED MODEL OF THE HIGH LATITUDE IONOSPHERE FOR TELECOMMUNICATIONS APPLICATIONS
C. M. Rush, R. K. Rosich, C. B. Brooks, D. L. Leise, and M. PoKempner Jan. 1982 34 p refs Sponsored in part by AFGL
(PB82-187196; NTIA-82-94) Avail: NTIS HC A03/MF A01 CSCL 17B

A model of the parameters that specify the structure of the electron density in the polar ionosphere was developed. The model is based upon the modification of monthly median ionospheric parameters, from formulations that characterize specific features of the high latitude ionosphere. In addition to the critical frequency, height of maximum electron density and semithickness of the E, F1, and F2 regions, the model accounts for high latitude features such as the auroral oval, the F2 region ionization trough, the ionization due to auroral E layer formation, auroral absorption, and electron density irregularities in the D and F regions of the polar ionosphere. Observations of ionospheric and geophysical

parameters can also be used to modify the structure of the ionosphere is given by the model. The use of the model for telecommunication purposes is illustrated by application of the model to a high latitude high frequency broadcasting operation.
GRA

N83-11391# Rensselaer Polytechnic Inst., Troy, N. Y. Electrical, Computer, and Systems Engineering.
IMAGE PROCESSING TECHNIQUES
Lester A. Gerhardt *In* AGARD Image Process. Tech. May 1982 5 p (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11393# Twente Univ. of Technology, Enschede (Netherlands). Dept. of Electrical Engineering.
FUNDAMENTALS OF DIGITAL IMAGERY AND DISPLAY
D. Bosman *In* AGARD Image Process. Tech. May 1982 21 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11397# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
DIGITAL IMAGE TRANSMISSION AND CODING
J. W. Modestino (California Univ. at San Diego, La Jolla) *In* AGARD Image Process. Tech. May 1982 8 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11398# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
DIGITAL IMAGE PROCESSING WITH APPLICATIONS TO FEATURE EXTRACTION
J. W. Modestino (California Univ. at San Diego, La Jolla) *In* AGARD Image Process. Tech. May 1982 11 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11708# Joint Publications Research Service, Arlington, Va.
MOLECULAR MECHANISMS OF EFFECTS OF BOTULINUS AND TETANUS NEUROTOXINS
V. K. Lutsenko *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 1-20 refs Transl. into ENGLISH from Usp. Sovrem. Biol. (USSR), v. 91, no. 1, Jan.-Feb. 1981 p 99-113 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-11443# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TRAVELING WAVE TUBE (TWT) LINEARIZERS IN SATELLITE COMMUNICATION SYSTEMS [LINEARIZADORES PARA TWT EM SISTEMAS DE COMUNICACAO POR SATELITE]
Eduardo Antonio Parada Tude Jul. 1982 24 p refs In PORTUGUESE; ENGLISH summary Presented at the 34th Ann. Reunion of SBPC, Sao Paulo, Brazil, 6-14 Jul. 1982
(INPE-2480-PRE/165) Avail: NTIS HC A02/MF A01

Research to evaluate the use of traveling wake tube (TWT) linearizers in communications system by satellite is reported the possibilities of reducing back-off and intermodulation products, in FDMA systems, and of reducing the bit error rate, in TDMA systems, are presented together with the techniques now used to build linearizers. Author

N83-11444# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PROGRAM FOR THE ANALYSIS AND OPTIMIZATION OF LINEAR CIRCUITS [PROGRAMA PARA ANALISE E OTIMIZACAO DE CIRCUITOS LINEARES]
Wilton Jose Fleming and Helcio Aranha Jul. 1982 42 p refs In PORTUGUESE; ENGLISH summary Presented at the 34th Ann. Meeting of SBPC, Campinas, Sao Paulos, 6-14 Jul. 1982
(INPE-2465-PRE/156) Avail: NTIS HC A03/MF A01

This program is used for the optimization of linear circuits. Basically the program analyses a given circuit, proceeds immediately with its optimization, and takes as reference a mask previously given by the user. The optimization consists in determining a series of circuit elements, which are limited in their maximum and minimum available values, trying to reproduce a characteristic of frequency response with respect to amplitude, input VSWR, output VSWR, and noise figure. The characteristics may be analyzed together or separately depending only on the requirements. S.L.

N83-11445# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
FREQUENCY MULTIPLIER FOR A GROUND STATION [MULTIPLICADOR DE FREQUENCIA PARA ESTACAO TERRENA]
Lucio Baptista Trannin Cividanes and Paulo Mello Marshall Jul. 1982 23 p refs In PORTUGUESE; ENGLISH summary Presented at the 34th Ann. Meeting of the Brazilian Soc. for the Progr. of Sci., Campinas, S.P., 6-14 Jul. 1982
(INPE-2455-PRE/150) Avail: NTIS HC A02/MF A01

A frequency multiplier with a multiplication factor of four, which is part of the local oscillator multiplication chain of an earth station, is described. The multiplier was realized on microstrip and has an input matching circuit and an output filter with bandwidths of 40% and 20%, respectively. With this procedure the required bandwidth of 12% was achieved. Author

N83-11446*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCES IN CORE LOSS CALCULATIONS FOR MAGNETIC MATERIALS
James E. Triner 1982 33 p refs Presented at the Fall Meeting of the Am. Ceram. Soc., Cambridge, Mass., 12-15 Sep. 1982
(NASA-TM-82947; E-1353; NAS 1.15:82947) Avail: NTIS HC A03/MF A01 CSCL 09C

A new analytical technique which predicts the basic magnetic properties under various operating conditions encountered in state-of-the-art dc-ac/dc converters is discussed. Using a new flux-controlled core excitation circuit, magnetic core characteristics were developed for constant values of ramp flux (square wave voltage excitation) and frequency. From this empirical data, a mathematical loss characteristics equation is developed to analytically predict the specific core loss of several magnetic materials under various waveform excitation conditions. In addition, these characteristics show the circuit designer for the first time the direct functional relatonships between induction level and specific core loss as a function of the two key dc-dc converter operating parameters of input voltage and duty cycle. R.J.F.

N83-11447*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE TUBES: A MAJOR CHALLENGE
Henry Kosmahl 1982 12 p Proposed for presentation at the Intern. Electron Devices Meeting, San Francisco, 13-15 Dec. 1982; sponsored by IEEE
(NASA-TM-82971; E-1397; NAS 1.15:82971) Avail: NTIS HC A02/MF A01 CSCL 09C

The application of the TWT - the backbone of all civilian and military space communication programs - to past, present and future satellites is discussed. Performance characteristics and the trends and challenges in the future are reviewed. Finally, a comparison with Solid States devices, as derived from fundamental laws, is made and limitations discussed. Author

N83-11448# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SHANGHAI RADIO FACTORY 14: THE FIRST IN THE COUNTRY TO SPECIALIZE IN MOS INTEGRATED CIRCUITS. IDEAL SEMICONDUCTOR DEVICES, FIELD-EFFECT TRANSISTORS, AND MOS INTEGRATED CIRCUITS
7 Jul. 1982 7 p Transl. into ENGLISH of Kexue Huabao (Communist China), no. 7, 1980 2 p
(AD-A118336; FTD-ID(RS)T-1697-81) Avail: NTIS HC A02/MF A01 CSCL 05/3

Products developed and distributed over a 10-year period include various series of FET's such as JDO, JDJ, and JCJ; CMOS general purpose digital integrated circuits, and field effect large scale integrated circuits. Specifications for the microprocessors and for the CMOS integrated circuits used in digital instruments, digital communications, microcomputers, and space electronic systems are included. A.R.H.

N83-11449# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
QUESTIONS OF THE CONSTRUCTION OF RESONANCE FERRITE RECTIFIERS
A. L. Mikaelyan and A. K. Stolyarov 13 Jul. 1982 33 p refs Transl. into ENGLISH from Elektrosvyaz (USSR), no. 9, 1960 p 42-51
(AD-A118263; FTD-ID(RS)T-0382-82) Avail: NTIS HC A03/MF A01 CSCL 20/3

The construction of resonance rectifiers in various wave ranges was studied. Methods of obtaining temperature stable characteristics of rectifiers, and means of lowering the weight and overall dimensions of the rectifiers are examined. The developed prototypes of rectifiers, intended for various applications, are described. GRA

N83-11450# Illinois Univ., Urbana. Dept. of Electrical Engineering.
NEAR MILLIMETER WAVE LOCAL OSCILLATOR SOURCES PROOF OF CONCEPTS Final Report, 31 May 1980 - 31 May 1982
Paul D. Coleman and Jay Freeman Jul. 1982 87 p refs
(Contract DAAK70-80-C-0066)
(AD-A118024; UILU-ENG-82-2539) Avail: NTIS HC A05/MF A01 CSCL 09/5

This final report describes research on the demonstration of a new solid state oscillator source principle in a GaAs/AlGaAs heterostructure. The negative differential resistance is based upon a real space transfer of hot electrons from a high mobility GaAs layer to a low mobility AlGaAs layer in the heterostructure. Tunable radiation in the 2-25 MHz range was achieved at a power level of 30 milliwatts in a first device. The potential exists to extend this oscillator into the 100-1000 GHz range since the transit time is associated with time of travel between the 100 A layers in the heterostructure. GRA

N83-11451# Hughes Aircraft Co., Canoga Park, Calif. Missile Systems Group.
MANUFACTURING METHODS AND TECHNOLOGY FOR MICROWAVE STRIPLINE CIRCUITS Final Technical Report, 15 Jan. 1981 - 26 Feb. 1982
Odel Graham 26 Feb. 1982 226 p refs
(Contract DAAH01-81-D-A001)
(AD-A118021; HAC-MSG-2078; HAC-REF-300615) Avail: NTIS HC A11/MF A01 CSCL 13/8

This is the final report for work performed on the MANTECH Microwave Stripline Circuit program for the period from 15 January 1981 to 26 February 1982. An investigation was made of the effect of tolerances on a broadband, three-layer, stripline circuit. Tolerances on the following parameters were considered: the dielectric constant of the stripline material, thicknesses of the materials, circuit line widths, alignment of circuits and the surface roughness of the copper cladding. The investigation used both analyses and measurements of actual stripline circuits. An investigation was also made of methods of measuring dielectric constant of the stripline material. The results of the study indicate that a printed wiring board facility can fabricate microwave stripline components if there is good control of all processes. This requires precision measurements of resist photospeed to compensate for lot variations, a highly uniform intensity output of exposure units and also feed and bleed chemical add systems to maintain bath chemistry. Alignment of phototools and machining of the circuit boards is compatible with the CAD/CAM facility and numerically controlled machine tools. Author (GRA)

N83-11452# Stanford Univ., Calif. Integrated Circuits Lab.
COMPUTER-AIDED ENGINEERING OF SEMICONDUCTOR INTEGRATED CIRCUITS Final Report 1 Mar. 1978 - 28 Feb. 1979
J. D. Meindl, R. W. Dutton, J. F. Gibbons, J. D. Plummer, and W. A. Tiller Jul. 1979 436 p refs
(Contract DAAB07-77-C-2684; ARPA Order 2985; DA Proj. 1T1-61101-A00-A)
(AD-A117982; ICL-7-77; TR-DXG569-79; DELET-TR-77-2684-F) Avail: NTIS HC A19/MF A01 CSCL 09/5

Economical procurement of small quantities of high performance custom integrated circuits for military systems is severely impeded by inadequate process, device and circuit models that handicap accurate computer-aided design at low cost. The salient objective of this program is to formulate physical models of fabrication processes, devices and circuits to allow total computer-aided design of custom large scale integrated circuit subsystems to reduce development cycle time and cost. The basic areas under investigation are: (1) ion implantation and diffusion of dopants, (2) thermal oxidation, (3) chemical vapor deposition of silicon, (4) device simulation and (5) analytical measurements. This report provides a detailed development of research results in developing computer-aids for modeling the IC fabrication process. The effort is vertically integrated and the outcome is the widely distributed SUPREM program. Moreover, device analysis capabilities have been developed based on SUPREM and applications have demonstrated. The impact of this effort on the design of custom VLSI is apparent and future research will explore, define and model the limits of technology for VLSI. Author (GRA)

N83-11453# Harris Corp., Melbourne, Fla. Government Information Systems Div.
FINITE ELEMENT ANALYSIS OF MICROELECTRONIC PACKAGES Final Technical Report
J. R. Southland, V. R. Beatty, and W. J. Vitaliano Griffiss AFB, N.Y. RADC May 1982 224 p refs
(Contract F30602-81-C-0083; AF Proj. 2338)
(AD-A117979; RADC-TR-82-133) Avail: NTIS HC A10/MF A01 CSCL 09/5

New and innovative methods are being applied to the analysis of the mechanical integrity of microelectronic packages. This study resulted in (1) a summary of commercially available finite element computer programs for both structural and thermal analyses, (2) a categorization of microelectronic problems that can be evaluated using analytical techniques, (3) assessment of applicable analysis techniques, (4) cost comparisons of exposing failure modes by the use of computer analysis rather than physical test, and (5) to provide engineers with a base of technical knowledge necessary for the application of the finite element technique to solve microelectronic reliability problems. Author (GRA)

N83-11454# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
STRESS SCREENING OF ELECTRONIC HARDWARE Final Technical Report, Aug. 1980 - Sep. 1981
A. E. Saari, R. E. Schafer, and S. J. VanDenBerg Griffiss AFB, N.Y. RADC May 1982 232 p refs
(Contract F30602-80-C-0250; AF Proj. 2338)
(AD-A118261; HAC-FR82-16-132; RADC-TR-82-87) Avail: NTIS HC A11/MF A01 CSCL 09/5

This report presents the results of a study to develop quantitative and qualitative techniques for planning, monitoring and evaluating stress screening programs during electronic equipment

development and production. A screening and debugging optimization (SDO) model developed on a prior study, RADC-TR-78-55, was revised to include current thermal cycling and vibration screening experience and an adaptive feature was added to allow stress screening program changes based on screening results.
Author (GRA)

N83-11455# Engins Matra, Velizy (France).
CERAMIC LIDS: EVALUATION REPORT [CAPOT CERAMIQUE. COMPTE-RENDU D'EVALUATION]
J. P. Jany 15 Dec. 1981 63 p refs Partly in FRENCH and ENGLISH
(DEL/JPJ/724) Avail: NTIS HC A04/MF A01

Utilization of hybrid substrate package styles and protection of the circuit by a lid hermetically sealed to the substrate were evaluated. Properties, quoted in the literature, are confirmed for this type of packaging. Good results in respect to microleaks are obtained. This packaging meets military requirements (- 55 C to + 175 C). It is recommended that further work be undertaken in order to reduce humidity inside the package on closing.
Author (ESA)

N83-11456# Engins Matra, Velizy (France).
THERMAL ANALYSIS BY ELECTRICAL ANALOGY FOR HYBRID POWER CIRCUITS [CALCUL THERMIQUR PAR ANALOGIE ELECTRIQUE SUR LE CIRCUIT HYBRIDE DE PUISSANCE]
Rames 18 Jan. 1982 154 p refs In FRENCH
(DEL/DR/JCR/777) Avail: NTIS HC A08/MF A01

A hybrid servocommand circuit design was subjected to thermal analysis. Temperature curves in function of operating time and equipment technology were determined as an aid to design optimization. In order to test the rheoelectrical simulation method, a known circuit was simulated. Results were compared with thermocouple measurements. Good agreement is found. Besides the heat equations used, thermodynamic data from the literature, essential to the simulation, are listed. The computer program is given. Infrared thermography used to obtain the approximate temperature of chips is also demonstrated. Author (ESA)

N83-11457# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
COMPUTER PROGRAMS FOR MICROSTRIP DISCONTINUITIES
Karl-Hans Waegel Sep. 1981 29 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-82-08) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 11,70

Seven computer programs for the calculation of the transmission characteristics of microstrip elements are presented. The structure and operation of the programs are described. The development of mathematical models for microstrip lines from the static model to a microstrip model with frequency dependent parameters is summarized. A conventional technique of handling line discontinuities (mode matching technique) is described as an introduction to the special field development technique which is used in the programs. The tested programs, written in FORTRAN, are cited. Author (ESA)

N83-11458# Loher G.m.b.H., Ruhstorf/Rott (West Germany).
IMPROVEMENT OF THE EFFICIENCY OF INDUCTION MOTORS Final Report, Jan. 1982
Karl Falk and Jochen Schoerner Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 43 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-113; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9

The electric motor as energy converter was studied for four groups of parameters: process, network, foundations, and environment. The feasibility of reducing the losses of asynchronous three phase motors with squirrel cage or with slip rings in the power output range from 100 to 1500 kW, was investigated. Mechanical losses from the bearings, from air friction, and from fan electromagnetic losses in the iron and in the copper, and the most efficient way of heat elimination due to this losses effect of a nonsinusoidal energy source on losses use of electronic controlled energy sources where variable load and speed are necessary, were studied. It is proved that for the studied motor range a better conception of ventilation is very useful and that the most efficient losses reduction are achieved by optimizing the electromagnetic design and the insulation techniques. Thyristor-based voltage regulators can achieve remarkable energy savings especially in the field of elevator technique in the speed range up to 2m/sec and in hoisting equipment. Author (ESA)

N83-11459# AEG-Telefunken, Seligenstadt (West Germany).
HIGH LOAD DISTRIBUTION NETWORK IN THE 80'S Final Report, Dec. 1980
Oskar Gebhardt Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 185 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-127; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 35

High duty, compact equipment having no negative environmental effects when used in high power distribution networks, was developed. Digital computer programs allowed for optimization of the design and simulation of the operating conditions of system components. A computer model allowed for testing and choosing the optimal medium voltage network and the possible extensions of the low tension network. Materials were elaborated and tested in order to guarantes a reliable long-term behavior of the components. This led to the development of a space saving insulator traverse and helped to solve stressing problems of VPE-cables also with internal forced water cooling. With the development and production of a subterranean muffled transformer for powerful low voltage consumers, all the necessary system components for a densely populated area are available. Author (ESA)

N83-11460# Felten and Guilleaume Carlswerk A.G., Cologne (West Germany). Versuchsanstalt fuer Hochspannungstechnik.
HIGH POWER CABLE WITH INTERNAL WATER COOLING 400 kV Final Report, Jan. 1981
Werner Rasquin and Bernd Harjes Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 15 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-132; ISSN-340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4,50

Due to the concentration of electricity production in large power plants, the need of higher power transmissions, and the protection of environment, developement of a 400 kV water cooled cable in the power range of 1 to 5 GVA was undertaken. The fabrication and testing of equipment, engineering of cable components, fabrication of a test cable, development of cable terminal laboratory, testing of test cable, field testing of test cable, fabrication of industrial cable laboratory, testing of industrial cable, field testing of industrial cable, and system analysis for optimization were prepared. The field testing was impossible to realize. However, it is proved that a cable consisting of an internal stainless steel water cooled tube, covered by stranded copper profiles, insulated with heavy high quality paper, and protected by an aluminum cover can be produced, withstand tests accordingly to IEC/VDE recommendations, and is able to fulfill all exploitation conditions.
Author (ESA)

N83-11461# Technical Research Centre of Finland, Espoo. Electrical Engineering Lab.
CHARACTERISTICS OF AN EQUIDISTANT FIRING SYSTEM IN 12-PULSE CONVERTER BRIDGES FOR HVDC
Kaj Juslin, Yrjoe Laiho, and Vesa Vauhkonen May 1981 33 p refs
(PB82-206905; TIEDONANTO-61) Avail: NTIS HC A03/MF A01

CSCL 09E

The construction of a simulation model for a twelve pulse HVDC transmission line is discussed. The realized equidistant pulse phase control system is suitable for the operation in weak or strongly unbalanced ac systems from the viewpoint of harmonic instability and suppression of abnormal harmonic currents. The phase of the firing pulses is proportional to an absolute level of the control voltage, and the operation with a constant control angle is possible. The synchronism with an ac system is guaranteed by a phase-locked loop, not by the main control loop. Thus quick and ideal response is obtaind. The measurements show that this kind of grid conrol is stable also in many faulty conditions. Abnormal harmonic generation of the converter is very small compared with the traditional systems by utilizing this kind of grid control. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-11462*# Northwestern Univ., Evanston, Ill.
THERMOCAPILLARY FLOWS AND THEIR STABILITY: EFFECTS OF SURFACE LAYERS AND CONTAMINATION Annual Report
S. H. Davis and G. M. Homsy (Stanford Univ.) Oct. 1982 5 p refs
(Contract NAS8-33881)
(NASA-CR-170654; NAS 1.26:170654) Avail: NTIS HC A02/MF A01 CSCL 20D

The fluid mechanics and heat transfer of motions driven by surface tension gradients (Marangoni convection) were analyzed theoretically to obtain an understanding of the convection accompanying the process of growing high quality single crystals from the melt in a mu-g environment. The geometries considered include two dimensional liquid filled slots and axisymmetric float zone configurations. A.R.H.

N83-11463*# Illinois Univ., Urbana-Champaign. Dept. of Mechanical and Industrial Engineering.
NUMERICAL CALCULATION OF THE PARAMETERS OF THE EFFLUX FROM A HELIUM DEWAR USED FOR COOLING OF HEAT SHIELDS IN A SATELLITE Final Report, Sep. 1981 - Jul. 1982
Keith Brendley and John C. Chato Jul. 1982 54 p refs
(Grant NAG2-144)
(NASA-CR-166416; NAS 1.26:166416) Avail: NTIS HC A04/MF A01 CSCL 20C

The parameters of the efflux from a helium dewar in space were numerically calculated. The flow was modeled as a one dimensional compressible ideal gas with variable properties. The primary boundary conditions are flow with friction and flow with heat transfer and friction. Two PASCAL programs were developed to calculate the efflux parameters: EFFLUZD and EFFLUXM. EFFLUXD calculates the minimum mass flow for the given shield temperatures and shield heat inputs. It then calculates the pipe lengths, diameter, and fluid parameters which satisfy all boundary conditions. Since the diameter returned by EFFLUXD is only rarely of nominal size, EFFLUXM calculates the mass flow and shield heat exchange for given pipe lengths, diameter, and shield temperatures. Author

N83-11464# Naval Research Lab., Washington, D. C.
PSEUDOSPECTRAL SOLUTION OF ONE DIMENSIONAL AND TWO DIMENSIONAL INVISCID FLOWS WITH SHOCK WAVES
L. Sakell 6 Aug. 1982 34 p refs
(RR0130242)
(AD-A118163; NRL-MR-4892) Avail: NTIS HC A03/MF A01 CSCL 20/4

A new approach is presented for the utilization of pseudospectral techniques for the solution of inviscid flows with shock waves using the full Euler equations of motion. Artificial viscosity is applied together with low pass spectral filtering to damp out pre and post cursor numerical oscillations. Solutions are presented for the one dimensional propagating shock wave problem and for two dimensional supersonic wedge flows. Author (GRA)

N83-11465# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Science and Technology Lab.
APPLICATION OF A DISCRETE NONLINEAR SPECTRAL MODEL TO IDEAL CASES OF WIND WAVE GENERATION
J. H. Allender and M. Lybanon Apr. 1982 205 p refs
(RR03105330)
(AD-A118168; NORDA-TN-148) Avail: NTIS HC A10/MF A01 CSCL 20/4

The discrete nonlinear spectral model developed by Allender, Barnett, and Lybanon is applied to seven ideal cases of wind wave generation. These cases form the basis of an international study to compare wave prediction models. Model results are summarized graphically for each case, as applicable, and a brief explanation of model behavior is given. The model is free of numberical dispersion and damping, and reproduces the JONSWAP relations for fetch- and duration-limited wave growth quite well. Model results from cases with increasing complexity provide a benchmark for understanding model behavior in actual situations and for future improvements. Author (GRA)

N83-11466# Naval Postgraduate School, Monterey, Calif.
OSCILLATING FLOW ABOUT YAWED CYLINDERS M.S. Thesis
Dean O. Trytten Mar. 1982 130 p refs
(AD-A118212) Avail: NTIS HC A07/MF A01 CSCL 20/4

The forces acting on yawed smooth and rough circular cylinders in oscillating flow have been investigated for the purpose of determining the appropriate force-transfer coefficients and the applicability of the 'independence principle.' The results have shown that the flow about each cylinder is unique and the independence principle does not hold true. In addition, a comprehensive sensitivity analysis has been carried out to investigate the effects of undetected environmental disturbances on the force-transfer coefficients and the limits of probable errors have been delineated. Author (GRA)

N83-11467# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL TECHNIQUE FOR THE STUDY OF VELOCITY PROFILES IN A GROWING DROPLET USING A PULSED NITROGEN LASER M.S. Thesis
August Frederick Pellin, III Mar. 1982 62 p refs
(AD-A118269) Avail: NTIS HC A04/MF A01 CSCL 20/4

An ultraviolet beam (337.1 nanometers) from a pulsed nitrogen gas laser fired through a fluid containing a photochromic dye produces opaque traces in the fluid along the path of the laser beam. Subsequent movement of the fluid deforms the opaque traces and produces a record of the fluid flow. A high powered laser has been designed, built, and tested. Velocity distribution have been obtained in slowly forming droplets of solvent in an immiscible ambient fluid. Author (GRA)

N83-11468# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
TURBULENT SWIRLING FLOW DOWNSTFREAM OF AN ABRUPT PIPE EXPANSION: MODELING AND EXPERIMENTAL MEASUREMENTS Interim Report, 1 Jun. 1981 - 31 May 1982
Darryl E. Metzger and G. Paul Neitzel Jul. 1982 53 p refs
(Contract N00014-81-K-0428)
(AD-A118136; CR-R82036) Avail: NTIS HC A04/MF A01 CSCL 20/4

This report covers activities during the first year under ONR contract N00014-81-K-0428. The project is a combined experimental and numerical investigation of heat transfer and fluid dynamic characteristics of a turbulent swirling flow in a pipe downstream of a sudden expansion. Local wall heat transfer measurements as

well as detailed flowfield measurements utilizing laser-Doppler velocimetry (LDV) techniques are planned for the experiments. Numerical modeling efforts will focus on the development of a code which is efficient enough to be useful for design purposes, while accurately modeling the flow field. GRA

N83-11469# National Aeronautical Establishment, Ottawa (Ontario). Low Speed Aerodynamics Lab.

FLOW VISUALIZATION WATER TUNNEL: ITS CONSTRUCTION AND CAPABILITIES

G. A. Dobrodzicki Apr. 1982 54 p refs In ENGLISH; FRENCH summary

(AD-A117959; NAE-LR-610; NRC-20235) Avail: NTIS HC A04/MF A01 CSCL 14/2

The utility of the flow visualization water tunnel in the field of experimental fluid dynamics is demonstrated and guidance is provided to its prospective users. The facility and its ancillary equipment and the flow visualization techniques are described. The diversity of subjects tested in the water tunnel are emphasized. GRA

N83-11470# Flow Research, Inc., Kent, Wash.

VISUALIZATION STUDY OF TURBULENT SPOTS Final Technical Report, 1 May 1980 - 30 Apr. 1982

Mohamed Gad-el-Hak and James J. Riley 1 May 1982 67 p refs

(Contract F49620-78-C-0062; AF Proj. 2307)

(AD-A118441; FRC-230; AFOSR-82-0651TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

An experimental investigation was conducted in the Flow Research 18-m towing tank to study turbulent spots evolving in laminar boundary layers and to modulate the resulting flow fields using salinity stratification, polymer, or unsteady boundary conditions. The research was directed towards understanding the different processes occurring during transition and the similarities, if any, between those processes and the intermittent events that characterize the wall region of fully-developed turbulent boundary layers. Author (GRA)

N83-11471# California Univ., Livermore. Lawrence Livermore Lab.

WEAK-SHOCK THEORY FOR SPHERICAL SHOCK WAVES

W. D. Curtis, C. E. Rosenkilde, and K. S. Yee Mar. 1982 35 p refs Prepared in cooperation with Kansas State Univ., Manhattan

(Contract W-7405-eng-48)

(DE82-018813; UCID-19378) Avail: NTIS HC A03/MF A01

Weak shock theory was developed in a form which permits utilization of output from a hydrodynamic code (e.g., KOVEC) as either an initial or boundary condition. The wave evolution is followed to much greater distances than the codes themselves can attain. DOE

N83-11472# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.

THE THEORY OF TURBULENT FLOW WITH COMPLEX CHEMICAL KINETICS Ph.D. Thesis - London Univ.

Luen Tong Tam Feb. 1981 231 p refs Sponsored by UK Science Research Council and Concentration Heat and Momentum Ltd.

(HTS/81/7) Avail: NTIS HC A11/MF A01

The ESCIMO theory biographic aspect is applied to the burning process in a single fold composed of a layer of fresh gaseous premixed hydrogen+oxygen+nitrogen system and a layer of the corresponding hot products. Prediction agrees with observation. The nonmixed fold model is validated by comparing predictions with experimental data on the idealized stretching fold in a converging channel. The complete ESCIMO theory is applied to a premixed, steady flow, well stirred reactor under fully turbulent conditions. Performance is calculated as a function of chemical loading, Reynolds number and mixing rate. The influence of fold formation, the blowout limit, the population average reaction rate, and the probability density functions (PDF) are considered. Results, expressed as first and second moments of the corresponding PDF, show that the PDF of concentration fluctuations must be calculated from the theory rather than the presumed PDF procedure. Author (ESA)

N83-11473# Laboratoire d'Aerothermique du CNRS, Meudon (France).

LASER DOPPLER ANEMOMETER MEASUREMENTS IN A TURBULENT JET AT HIGH TEMPERATURE

I. Goekalp, P. Gougat, A. Lasek, and F. Martin 1980 12 p refs Proc. of Symp. on Long Range and Short Range Opt. Velocity Meas., St. Louis, France, 15-18 Sep. 1980

(ISL-R-117/80; Publ-637ter; ISSN-0248-451X) Avail: NTIS HC A02/MF A01

Measurements of the dynamic field at the exit section of a heated turbulent axisymmetric free jet with the mean temperature ranging from the ambient to 500 C are presented. The experimental setup and signal processing are explained. Measurements of velocity fluctuations show the influence of the mean temperature increase. For hot flows at constant Reynolds number, an additional dependence of the turbulence intensity on the temperature is observed. This result is unconventional since in classical turbulence studies the temperature effect is already involved in the Reynolds number by the bias of the kinematic viscosity. Power spectra also show some dependence on the temperature at constant Reynolds number. Author (ESA)

N83-11474# Laboratoire d'Aerothermique du CNRS, Meudon (France). Equipe des Ecoulements Polyphasiques.

THE MOVEMENT OF WATER DROPLETS IN CLOUDS AROUND THE NOSE OF AN ATMOSPHERIC RESEARCH AIRCRAFT [MOUVEMENT DES GOUTELETTES D'EAU DES NUAGES AUTOUR DU NEZ D'UN AVION DE RECHERCHES ATMOSPHERIQUES]

P. Feuillebois and M. F. Scibilia Sep. 1981 32 p refs In FRENCH

(Rept-81-3; Publ-660; ISSN-0248-451X) Avail: NTIS HC A03/MF A01

The dynamic interaction between droplets and the airflow around the hemispherical nose of an aircraft was evaluated. The effect of the aircraft nose on droplet sampling for cloud research is explained. The proportion of different droplet sizes and their concentration at each point around the aircraft nose were determined. In a cloud, interaction between droplets is negligible. Each particle acts, for the calculation of the forces applied to it, as if it is alone in the air. The airflow carrying the droplets, on the average, is not influenced by their presence. The trajectory of each droplet was studied separately after calculating dry airflow. Concentrations were found with a Lagrangian method, using two trajectories computed directly close to one another. Theory confirms that to within 3% experimentally measured concentrations are representative of those in a cloud. Author (ESA)

N83-11475# Stuttgart Univ. (West Germany). Inst. fuer Kernenergetik und Energiesysteme.

COMPARISON BETWEEN NEW THERMOHYDRAULIC ONE-CHANNEL MODELS AND EXPERIMENTS [VERGLEICH NEUERER THERMOHYDRAULISCHER EINKANALMODELLE MIT DEM EXPERIMENT]

Helmut Blender and Jochen Elzmann Nov. 1981 100 p refs In GERMAN

(IKE-6-134; ISSN-0173-6892) Avail: NTIS HC A05/MF A01

Five different thermohydraulic one-channel models, COCHA, FRANCESCA, MARMITA, STASWR and THS, were tested bu experimentally checking two-phase flows along a boiling water reactor fuel element. As regards the evolution of the vapor content along the cooling channel, the agreement between all the programs and the measurements is satisfactory for small to middle entrance undercooling in the domain of undercooled boiling. For high undercooling, only the COCHA program gives satisfactory results. For the middle part of the cooling channel, all programs are satisfactory, while in the upper part, especially for increasing outlet vapor contents, the calculated values are generally too low for all programs, and especially for FRANCESCA. Author (ESA)

N83-11476# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
NAVIER-STOKES SOLUTIONS FOR LAMINAR INCOMPRESSIBLE BOUNDARY LAYERS WITH STRONG VISCOUS-INVISCID INTERACTION
R. D. Heidsieck Apr. 1982 129 p refs
(VTH-LR-353) Avail: NTIS HC A07/MF A01

In this method, the usually prescribed pressure distribution is replaced by an interactive boundary condition which models the behavior of the outer flow past a curved wall with boundary layer. This approach enables simultaneous solution of boundary layer and outer flow, avoiding the difficulties associated with either direct or inverse methods. A fast convergence is obtained without encountering numerical instabilities in separation points. The interactive boundary condition is consistent with the description by asymptotic triple-deck equations of the flow near a singular point. The method is capable of solving both boundary layer equations and the complete Navier-Stokes equations. Results are presented for trailing-edge flows of both a flat plate and a body with finite trailing-edge angle. Author (ESA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-11477# National Physical Research Lab., Pretoria (South Africa).
HOW TO USE TRANSPARENT DIAZO COLOUR FILM FOR INTERPRETATION OF LANDSAT IMAGES
O. G. Malan May 1981 41 p Original document contains color illustrations
(CSIR-Manual-9; CSIR-Manual-K58; ISBN-0-7988-21434) Avail: NTIS HC A03/MF A01

Instruction manual to further the practical application of space techniques in developing countries. This manual is aimed at potential users of LANDSAT data with some basic training in scientific disciplines, but without special training in photographic darkroom techniques. The procedures described here require an absolute minimum of equipment and material other than positive transparencies of LANDSAT MSS images and suitable diazo material. S.L.

N83-11478 Royal Aircraft Establishment, Farnborough (England). Space Dept.
THE MODIFICATION OF A PENLESS THERMAL CHART RECORDER TO DIRECTLY DISPLAY DIGITAL TELEMETRY DATA
J. A. C. Beattie Jan. 1982 12 p
(RAE-TM-SPACE-299; BR83046) Copyright. Avail: Issuing Activity

A microprocessor based thermal chart recorder was modified in order to accept serial digital telemetry and to output a synchronous display of up to six selected data bytes. Author (ESA)

N83-11479# Army Missile Command, Redstone Arsenal, Ala. Missile Lab.
MULTIPLEX HOLOGRAPHIC FILTERING THROUGH CONTACT SCREENS
J. C. Duthie and H. K. Liu 8 Feb. 1982 23 p
(AD-A118430; AD-E950270; DRSMI/RR-82-7-TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

The basic principle of applying a specific contact screen for performing multiplex holographic filtering in a real-time coherent optical correlator is described. The specific design and fabrication of a one-dimensional and a two-dimensional gray density contact screen are described. The two-dimensional screen can yield nearly a 5 x 5 array of spectra islands in a coherent image processor. Author (GRA)

N83-11480# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN INFLIGHT RECORDER PROTOTYPE FOR THE INFLIGHT PHYSIOLOGICAL DATA ACQUISITION SYSTEM 3 M.S. Thesis
Robert Eugene Meisner Feb. 1982 272 p refs
(AD-A118072; AFIT/GCS/EE/82M-5) Avail: NTIS HC A12/MF A01 CSCL 14/3

A prototype for the Inflight Recorder component of the Inflight Physiological Data Acquisition System was built. The Inflight Recorder is a remote data acquisition computer for sampling physiological data. Characteristics of the recorder's design were solid-state, microprocessor controlled, expandability, 16 sensor inputs, and 122 samples per second. Demonstration of battery operation for four hours and unobstructive size characteristics awaits further testing. Following a hardware requirements analysis, the prototype was built using Complementary Metal Oxide Semiconductor (CMOS) integrated circuits. Components featured in the design were a CMOS microprocessor; Electrically Erasable Programmable Read Only Memories (EEPROM); a monolithic, 16 channel, analog to digital converter; and Magnetic Bubble Memories (MBM). In addition to building the IR prototype, several development tools have been constructed. One was a EEPROM Programmer. Another was an MBM Interactive Development System. A third was a hardware front panel for debugging IR software. User's manuals for these tools appear in appendices to the thesis. GRA

N83-11481# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN, CONSTRUCTION, AND ANALYSIS OF AN ULTRA-LOW EXPANSION QUARTZ RESONANT CAVITY PASSIVE RING RESONATOR LASER GYROSCOPE M.S. Thesis
Keith A. Pugh Mar. 1982 180 p refs
(AD-A118088; AFIT/GE/EE/82-9) Avail: NTIS HC A09/MF A01 CSCL 20/5

The purpose of this research is to design and build a Passive Ring Resonator Laser Gyroscope (PRLG) that is small in size, constructed from a thermally stable material, and utilizes a laser cavity--resonant cavity mode match design. The small size design is dominated by the physical size of the available components; consequently, the small design is as small as physically possible with these components. The dimensions of the PRLG are as follows: (1) the perimeter of the resonant cavity is 45.2 cm., (2) the laser cavity is 22 cm. long, and (3) the distance from the center of the laser cavity to the input mirror of the resonant cavity is 49.664 cm. The thermally stable material obtained for the PRLG is a block of Ultra-Low Expansion Quartz (ULE Quartz). The coefficient of thermal expansion for ULE Quartz is 0.55 x 10 to the minus 6th power cm./cm./C, thus making this material a very thermally stable material. Due to the configuration and size of this ULE Quartz block, only the resonant cavity portion of the PRLG is formed using the ULE Quartz block. The laser cavity--resonant cavity mode matching design is accomplished in three steps. First, the spot size of the resonant cavity beam is determined at some point outside the resonant cavity. Second, the laser is designed such that its spot size is identical to the spot size of the resonant cavity beam at that same point. Third, the radius of curvature of the external corner mirror required to change the radius of curvature of the laser cavity beam into the radius of curvature of the resonant cavity beam is determined. GRA

N83-11482# Philips Zentrallaboratorium G.m.b.H., Hamburg (West Germany).
DATA TERMINAL WITH DISPLAY AND PRINTER BASED ON OPTICAL MEMORY MATERIAL Final Report, Sep. 1981
Bernhard Hill and Klaus Peter Schmidt Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 82 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-DV-82-001; ISSN-0170-9011) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17

Different x-y addressed light-switching arrays with a high number of elements were developed, using a technology for the modulation of light in thin magnetooptical layers. This technology allows the integration of a large number of light-switching elements on a common substrate. The elements can be switched electronically via evaporated thin film addressing networks and semiconductor components. Besides theoretical investigations on various addressing networks, matrices of 64 by 64 and 64 by 256 light-switching elements were fabricated together with electronic control circuits. The applicability of the matrices in a system for the display of alphanumeric or graphic information was demonstrated by the laboratory model of a magnetooptic display with 64 by 256 picture elements equipped with a microprocessor-controlled keyboard for information write-in. Text was displayed successfully on the screen. The essential advantages are the memory effect of the magnetooptic layer, the flicker free display and the direct compatibility with integrated drive circuits.

Author (ESA)

N83-11483# Rolls-Royce Ltd., Derby (England). Advanced Research Lab.

OPTICAL METHODS OF FLOW DIAGNOSTIC IN TURBOMACHINERY

C. J. Moore, D. G. Jones, C. F. Haxell, P. Bryanston-Cross, and R. J. Parker 1982 13 p refs

(PNR-90109) Avail: NTIS HC A02/MF A01

Holographic interferometry and laser anemometer techniques of investigating flow within turbomachinery blade rows are described. The position of the intrapassage shock system at different radial heights was investigated. Agreement between the position of laser anemometry contours and major optical phase changes in corresponding holograms is excellent. Although both techniques can locate the shocks spatially, only laser anemometry can quantitatively determine their strength. Anemometry is essential for determining where the flow becomes subsonic in transonic fans with oblique shock systems. Author (ESA)

N83-11484# Rolls-Royce Ltd., Derby (England).

STRAIN GAUGES USED FOR TORQUE MEASUREMENT IN A GAS TURBINE ENVIRONMENT

J. W. H. Chivers 1982 12 p

(PNR-90111) Avail: NTIS HC A02/MF A01

A technique of measuring the torque in the shaft between the low pressure turbine and the fan of the RB211 engine was developed. The low pressure system torque is measured by three independent strain gage bridges, oriented such that they are sensitive to torsional stress in the shaft and insensitive to axial and bending loads. The system was used in three separate engine tests. Absolute system accuracy of better than + or - 1% full scale torque is achieved. Agreement between the bridges is better than + or - 0.2% of mean torque value. Author (ESA)

N83-11485# Rolls-Royce Ltd., Derby (England). Electronics and Instrumentation Research Group.

RADIATION PYROMETRY IN GAS TURBINE RESEARCH AND DEVELOPMENT

J. Douglas 1982 11 p

(PNR-90116) Avail: NTIS HC A02/MF A01

Applications of radiation pyrometers to rotating component and turbine blade test rigs, engine testing, and thermography are outlined. They monitor compressor and turbine disk temperatures in high temperature tests. In low pressure testing of turbine blades, the pyrometers ensure that components are not overheated, by controling the rig cycle. These pyrometers can be used in tests os engine control transducers since pyrometer output can be correlated with gas stream temperature and used to indicate when the engine is at its maximum operating temperature. In thermography, pyrometer systems are used to visualize temperature distributions without the need for absolute temperature measurements.

Author (ESA)

N83-11486# Rolls-Royce Ltd., Derby (England).

SOME LASER MEASUREMENT TECHNIQUES USED IN AERO ENGINE RESEARCH

D. G. Jones 1982 4 p refs Presented at Appl. of Lasers to Combustion Engines Seminar, 10 Mar. 1982

(PNR-90118) Avail: NTIS HC A02/MF A01

Holographic flow visualization and laser anemometry are described. Flow within a fan blade passage can be visualized in three dimensions by recording two superimposed holograms on the same film, using a double pulse laser. Interferometric fringes formed by the images represent a shearing of the density field with respect to itself, caused by rotor movement during the separation of the double pulse laser. Shocks, overtip vortices, wakes, shock interaction with the boundary layer, and separated boundary layers can be observed. The anemometer measures the time taken for particles to cross between two focused laser beams separated by a known amount. The backscattered light from each beam is recorded by two photomultipliers and the discriminated events from the two beams are cross correlated. Correlograms of events for selected angles of orientation of the two spots at gated positions in rotor passage provide a spatially localized, but time averaged, value of flow velocity. Author (ESA)

N83-11487# Geological Survey, Denver, Colo. Water Resources Div.

AUTOMATION OF AN ION CHROMATOGRAPH FOR PRECIPITATION ANALYSIS WITH COMPUTERIZED DATA REDUCTION Final Report, Sep. 1980 - Mar. 1982

Arthur G. Hedley and Marvin G. Fishman Mar. 1982 40 p refs Presented at 23rd Rocky Mountain Conf., 4 Aug. 1981

(PB82-211988; USGS/WRD/WRI-82-028) Avail: NTIS HC A03/MF A01 CSCL 14B

Interconnection of an ion chromatography, an autosampler, and a computing integrator to form an analytical system for simultaneous determination of fluoride, chloride, orthophosphate, bromide, nitrate, and sulfate in precipitation samples is described. Computer programs provided with the integrator are modified to implement ion chromatographic data reduction and data storage. The liquid flow scheme for the ion chromatograph is changed by addition of a second suppressor column for greater analytical capacity. An additional valve enables selection of either suppressor column for analysis, as the other column is regenerated and stabilized with concentrated eluent. Minimum limits of detection and quantitation for each anion are calculated; these limits are a function of suppressor exhaustion. Precision for replicate analyses of six precipitation samples for fluoride, chloride, orthophosphate, nitrate, and sulfate ranged from 0.003 to 0.27 milligrams per liter. To determine accuracy of results, the same samples were spiked with known concentrations of the above mentioned anions. Average recovery was 108 percent. Author

N83-11362# California Univ., Livermore. Lawrence Livermore Lab.

AN ACOUSTIC MICROSCOPE FOR SURFACE CHARACTERIZATION

Bruce W. Maxfield *In its* Mech. Eng. Res. Mar. 1982 p 25-30 (For primary document see N83-11355 02-31)

Avail: NTIS HC A03/MF A01

N83-11395# Royal Signals and Radar Establishment, Malvern (England).

PICTURE FORMATTING AND HARDWARE CONSIDERATIONS

T. R. Berry *In* AGARD Image Process. Tech. May 1982 21 p refs (For primary document see N83-11390 02-31)

Avail: NTIS HC A11/MF A01

N83-11396# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. Fuer Optoelektronik.

DFVLR'S DIBIAS, DESIGN AND IMPLEMENTATION OF A DIGITAL INTERACTIVE IMAGE PROCESSING SYSTEM

Klaus A. Ulbricht *In* AGARD Image Process. Tech. May 1982

12 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-11488# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODE ANALYSIS OF A MISALIGNED UNSTABLE RESONATOR M.S. Thesis
Richard W. Berdine Dec. 1981 86 p refs
(AD-A118041; AFIT/GEP/PH/81D-2) Avail: NTIS HC A05/MF A01 CSCL 20/6

The integral equation that describes mode structure of an unstable resonator with rectangular apertures is developed from scalar diffraction theory. This equation, modified to account for misalignments, is solved by applying the asymptotic methods developed by Horowitz. A second order approximation of the method of stationary phase is the employed to calculate phase and intensity values for all points in the output plane. The phase front is also curve fitted to a straight line over the geometrical region for the lowest loss mode. From the slope of the straight line, a direction of propagation can be attributed to the wave. This is a diffracted beam steering angle and is additional to the geometric steering angle (i.e., the beam steering angle due to the geometric misalignment of either or both mirrors). Plots of intensity and phase for various degrees of misalignments are presented as results of a computer program that utilizes the derived expressions. Also included are graphs of the phase slope versus mirror misalignment. Author (GRA)

N83-11489# EIC, Inc., Newton, Mass.
LASER SPOT SCANNING OF PHOTOELECTROCHEMICAL CELLS
Margaret E. Langmuir, Ronald H. Micheels, Robert A. Boudreau, and R. David Rauh Aug. 1982 18 p refs Presented at the 160th Electrochem. Soc. Symp. on Photoelectrochem. Processes and Measurement Tech. for Photoelectrochem. Solar Cells, Denver, 11-16 Oct. 1981
(Contract N00014-79-C-0700)
(AD-A118268; C-598; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/5

Laser scanning of the photoelectrode in a photoelectrochemical cell is a powerful diagnostic tool for assessing the effect of surface modifications of the semiconductor electrode on cell performance. Photocurrent scan maps of photoelectrodes with external and/or white light bias allow the study of the effect of IR losses in the cell under operating conditions. A dye laser adds versatility to the system by permitting wavelength dependent responses to be mapped. The possibility of time resolved measurements, using a pulsed laser source, is also discussed. Author (GRA)

N83-11490# Letterman Army Inst. of Research, San Francisco, Calif.
OCULAR EFFECTS OF RELATIVELY EYE SAFE LASERS
Bruce E. Stuck, David J. Lund, and Edwin S. Beatrice 18 Jun. 1982 13 p refs Presented at the Army Sci. Conf., 15-18 Jun. 1982
(AD-A117484) Avail: NTIS HC A02/MF A01 CSCL 06/18

Laser devices are an important part of current and future Army systems. Laser rangefinders, designators, communicators, and training devices are currently deployed or are in some stage of development. Most current laser rangefinders and designators, which enhance the effectiveness of the modern Army weapon systems, operate in the visible and near infrared region of the electromagnetic spectrum. The eye is particularly vulnerable in this wavelength region. The collimated laser radiation collected by the eye is transmitted by the ocular media with little attenuation and focused to a small spot on the sensory retina. The retinal irradiance is several orders of magnitude greater than that incident on the cornea; therefore, the total intraocular energy required to produce a retinal lesion is small. Lasers with output characteristic similar to those being fielded are capable of producing serious retinal injury at ranges that are tactically significant (1). The use of binoculars or magnifying optics increases the range at which these injuries can occur. Such devices cannot be used in training exercises without appropriate control restrictions or the use of protective devices. In some cases, training with the actual system in a realistic scenario is inhibited by these restrictions and troop proficiency may never be attained. Author (GRA)

N83-11491# Letterman Army Inst. of Research, San Francisco, Calif.
AUTORADIOGRAPHY OF PRIMATE RETINA AFTER Q-SWITCHED RUBY LASER RADIATION
Steven T. Schuschereba and Edwin S. Beatrice 18 Jun. 1982 15 p refs Presented at The 1982 Army Sci. Conf., 15-18 Jun. 1982
(AD-A117483) Avail: NTIS HC A02/MF A01 CSCL 06/18

Biological implications in the use of laser devices by the Army has been the subject of study in the last two decades. A principal concern of laser bioeffects investigations has been mechanism and recovery processes of retinal tissue after damage by laser radiation near the visible damage threshold. The work objectives of this study were: (1) to evaluate the recovery of Rhesus monkey retinal rods (similar in retinal structure to the human) after exposure (20 nsec pulse duration, 1000 micrometers beam spot-size) to a range of Q-switched ruby laser radiation (suprathreshold to subthreshold for retinal damage as evidenced by ophthalmoscopy); (2) to correlate morphologic damage by both light and electron microscopy with biochemical abnormalities observed by autoradiography, (3) to assess the degree of sensitivity provided by autoradiography and (4) to postulate possible damage and recovery processes. GRA

N83-11492# Letterman Army Inst. of Research, San Francisco, Calif.
LASER OCULAR FLASH EFFECTS
H. Zwick, Kenneth R. Bloom, David J. Lund, and E. S. Beatrice 18 Jun. 1982 11 p refs Presented at the 1982 Army Sci. Conf., 15-18 Jun. 1982
(AD-A117430) Avail: NTIS HC A02/MF A01 CSCL 06/18

During this decade, lasers on the modern battlefield will become a directed energy threat to the eyes of ground force military personnel (1, 2, 3). One needs only to reflect on the enormous increase in electro-optical battlefield devices presently being developed to both train and equip troops for combat to suspect that a dramatic increase in accidental and intentional exposure incidence may well occur. Laser rangefinders (single pulse) and designators (multiple pulse) are anticipated to be commonplace in the modern electronic battlefield. While the future may hold to the concept of a laser injury as radiation that 'vaporizes' its target, now we need only to be concerned with those devices that disrupt the complex man-machine interface by ocular injury. Such interfaces are critical to a modern equipped Army, and ocular injury will severely affect this complexity. Laser devices that inflict such ocular damage are easily available and will be prolific in ground battlefield scenarios. The present investigation was designed to incorporate several key features of the military scenario in order to address the question of a low level laser threat to the eye and acute vision. GRA

N83-11493# Letterman Army Inst. of Research, San Francisco, Calif.
LASER FLASH EFFECTS: A NON-VISUAL PHENOMENON
David I. Randolph, Elmar T. Schmeisser, and Edwin S. Beatrice 18 Jun. 1982 11 p refs Presented at the 1982 Army Sci. Conf., 15-18 Jun. 1982
(AD-A117429) Avail: NTIS HC A02/MF A01 CSCL 06/18

The 20 nsec Q-switched ruby laser exposures centered on the fovea produced no immediate changes in the grating visual evoked potential for 50 and 500 micron spot sizes at two energy levels even when visible changes occurred at these sites. The

findings may have been the result of the ruby laser wavelength, which was near the visual sensitivity limit of the eye, or of the single Q-switched pulse which may have occurred too quickly to produce an immediate and/or sustained change in the cortical response. The observed delayed effects and subsequent apparent recovery of the VEP may reflect the development of edema at the laser exposure site resulting in the desynchronization of the response for a period of time. This is followed by apparent recovery which was interpreted as recruitment of the spared retinal elements with subsequent neural re-entrainment at the cortical level. GRA

N83-11494# Massachusetts Inst. of Tech., Cambridge.
LASER-INDUCED NUCLEAR ORIENTATION Final Report, 1 Nov. 1979 - 21 Dec. 1981
M. S. Feld and D. E. Murnick Sep. 1981 21 p refs
(Contract DE-AS02-78ER-04629)
(DE82-014539; DOE/ER-04629/1) Avail: NTIS HC A02/MF A01

Laser optical pumping experiments in sodium led to the discovery of three previously unrecognized effects: reduced saturation thresholds (compared to that expected in the absence of optical pumping); anomalous spectral structure; and extremely narrow features inside the natural linewidth. It was demonstrated that optical pumping using a single mode dye laser of a cell of sodium vapor with small traces (< 1 torr) of buffer gas can polarize the sodium nuclei over the entire Doppler profile. Complete polarization was achieved with laser intensities approx. 200 mW/sq cm with 1 torr of argon gas. These results are important for the preparation of polarized sources and targets for accelerator physics. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-11495*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE TRANSFER FUNCTION METHOD FOR GEAR SYSTEM DYNAMICS APPLIED TO CONVENTIONAL AND MINIMUM EXCITATION GEARING DESIGNS Final Report
William D. Mark Washington NASA Oct. 1982 111 p refs
(Contract NAS3-21978)
(NASA-CR-3626; NAS 1.26:3626; BBN-4712) Avail: NTIS HC A06/MF A01 CSCL 13I

A transfer function method for predicting the dynamic responses of gear systems with more than one gear mesh is developed and applied to the NASA Lewis four-square gear fatigue test apparatus. Methods for computing bearing-support force spectra and temporal histories of the total force transmitted by a gear mesh, the force transmitted by a single pair of teeth, and the maximum root stress in a single tooth are developed. Dynamic effects arisng from other gear meshes in the system are included. A profile modification design method to minimize the vibration excitation arising from a pair of meshing gears is reviewed and extended. Families of tooth loading functions required for such designs are developed and examined for potential excitation of individual tooth vibrations. The profile modification design method is applied to a pair of test gears. Author

N83-11496*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PLASTIC DEFORMATION AT SURFACE DURING UNLUBRICATED SLIDING
Takashi Yamamoto (Tokyo Univ.) and Donald H. Buckley Oct. 1982 20 p refs
(NASA-TP-2036; E-1036; NAS 1.60:2036) Avail: NTIS HC A02/MF A01 CSCL 20K

The plastic deformation and wear of 304 stainless-steel surface slid against an aluminum oxide rider were observed by using a scanning electron microscope and an optical microscope. Experiments were conducted in a vacuum of 0.000001 Pa and in an environment of 0.0005 Pa chlorine gas at 25 C. The load was 500 grams and the sliding velocity was 0.5 centimeter per second. The deformed surface layer which accumulates and develops successively is left behind the rider, and step-shaped protuberances are developed even after single pass sliding under both environmental conditions. A fully developed surface layer is gradually torn off leaving a characteristic pattern. These observations result from both adhesion and an adhesive wear mechanism. Author

N83-11497*# Detroit Diesel Allison, Indianapolis, Ind.
ADVANCED GAS TURBINE (AGT) POWERTRAIN SYSTEM Semiannual Technical Summary Report
H. E. Helms, J. Kaufeld, and R. Kordes Jul. 1981 111 p refs
(Contract DEN3-168)
(NASA-CR-165346; NAS 1.26:165346; EDR-10578; SATSR-2)
Avail: NTIS HC A06/MF A01 CSCL 21E

A 74.5 kW(100 hp) advanced automotive gas turbine engine is described. A design iteration to improve the weight and production cost associated with the original concept is discussed. Major rig tests included 15 hours of compressor testing to 80% design speed and the results are presented. Approximately 150 hours of cold flow testing showed duct loss to be less than the design goal. Combustor test results are presented for initial checkout tests. Turbine design and rig fabrication is discussed. From a materials study of six methods to fabricate rotors, two have been selected for further effort. A discussion of all six methods is given. S.L.

N83-11498*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRIBOLOGICAL PROPERTIES OF AMORPHOUS ALLOYS AND THE ROLE OF SURFACES IN ABRASIVE WEAR OF MATERIALS
Kazuhisa Miyoshi and Donald H. Buckley 1982 26 p refs Presented at the TMS-AIME Fall Meeting, St. Louis, 24-28 Oct. 1982
(NASA-TM-82973; E-1359; NAS 1.15:82973) Avail: NTIS HC A03/MF A01 CSCL 11G

The research approach undertaken by the authors relative to the subject, and examples of results from the authors are reviewed. The studies include programs in adhesion, friction, and various wear mechanisms (adhesive and abrasive wear). The materials which have been studied include such ceramic and metallic materials as silicon carbide, ferrites, diamond, and amorphous alloys. Author

N83-11499# Kyoto Univ. (Japan). Welding Procedure Committee.
APPLICATION OF ALUMINUM ALLOYS TO LARGE WELDED STRUCTURES IN JAPAN
M. Mizuno and H. Nagaoka (Ishikawajima-Harima Heavy Industries Co., Ltd.) [1982] 21 p refs
(IX-1197-81; XII-B-5-81; XII-E-9-81) Avail: NTIS HC A02/MF A01

Welding processes, the mechanical properties of welds, and typical structures constructed in Japan which demonstrate applications of aluminum alloys are discussed. Author

N83-11500# Ishikawajima-Harima Heavy Industries Co. Ltd., Yokohama (Japan). Welding Research Inst.
WELDING OF AL-MG ALLOY 5083-0 FOR THE CONSTRUCTION OF LNG STORAGE TANKS
Yoshikazu Kuriyama, Kazuyuki Minoda, Toshio Irisawa, and Hideyuki Nagaoka 1981 29 p refs Presented at the HW-JIW Colloq. on Production Technol. and Quality Assurance, Nagoya, Japan, 15 Apr. 1981
Avail: NTIS HC A03/MF A01

Liquefied natural gas (LNG) is receiving increasing attention as the most important source of energy in the interim period before coal and nuclear energy can take their turn in large scale energy production. Among the key elements to constitute an LNG supply system are the LNG tankers to transport the fuel from the gas liquefaction stations overseas and the LNG tanks for storing the imported fuel in reception centers at home. The tankers now

planned are mostly of the Moss type carrying spherically shaped aluminum alloy tanks installed independently of the ship's hull. The capacity increase of these tanks as well as their contruction in larger numbers in recent years have largely been made possible by improving the weldability of materials, by the adoption of better designs, by rationalizing construction methods and by automation of welding operations. The total techniques involving the production of Al-Mg alloy 5083-0 thick plate and its welding fabrication are the techniques which have rapidly developed in keeping with the growing demand of LNG and therefore there still remain some subjects on which further study is called for. The subjects that have been studied so far are surveyed concerning welding processes of 5083-0 thick plates, mechanical properties of the welded joints and measures for the prevention of weld defects, intended mainly for LNG tank construction. Author

N83-11501# Naval Air Engineering Center, Lakehurst, N.J. Support Equipment Engineering Dept.
FAILURE PROGRESSION MONITORING OF GREASE LUBRICATED TAPERED ROLLER BEARINGS BY WEAR DEBRIS ANALYSIS Final Report
Peter V. Ciekurs and J. W. Rosenleib Jul. 1982 49 p
(AD-A118370:NAEC-92-151) Avail: NTIS HC A03/MF A01 CSCL 13/9

This report documents a study of the wear debris characteristics of grease-lubricated tapered roller bearings. Bearings were operated to failure in a grease-lubricated environment. Samples of grease were periodically taken and ferrographically analyzed. The analysis was correlated to actual bearing condition through periodic inspection. Particle morphologies were indicative of bearing distress while quantitative data exhibited no characteristics patterns. Author (GRA)

N83-11502# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
AN EVALUATION OF FRETTING AT SMALL SLIP AMPLITUDES Status Report
Paul Kennedy 30 Jul. 1982 34 p refs
(WF61542000)
(AD-A118158; NADC-81205-60) Avail: NTIS HC A03/MF A01 CSCL 11/6

Fretting wear and resulting surface damage produced by the twisting motion of a flat steel specimen against a fixed 12.7 mm steel ball, has been investigated in the limited microslip region ranging from 0.05 to 5.0 microns. The construction of the test rig and the type of fretting wear associated with this particular specimen configuration and motion are discussed. This discussion covers data obtained either with SAE 52100 steel or Hastelloy B ball specimens in combination with SAE 1018 steel flat specimens. Author (GRA)

N83-11503# Army Construction Engineering Research Lab., Champaign, Ill.
MICROPROCESSOR CONTROLLED WELD ARC SPECTRUM ANALYZER FOR QUALITY CONTROL AND ANALYSIS Final Report
Michael E. Norris and C. S. Gardner Jun. 1982 133 p refs
(DA Proj. 4A7-62731-AT-41)
(AD-A118156; CERL-TM-M-317) Avail: NTIS HC A07/MF A01 CSCL 13/8

This thesis describes the components and operation of a system designed to analyze parameters associated with a weld arc. In particular, the spectrum, voltage, current, and travel speed of the weld arc are sampled by a microprocessor for analysis. Author (GRA)

N83-11504# Milwaukee School of Engineering, Wis. Fluid Power Inst.
BREAK-IN, PERFORMANCE AND ENDURANCE TESTS RESULTS ON FIXED DISPLACEMENT HYDRAULIC FLUID POWER VANE PUMPS Final Report, Dec. 1980 - Jun. 1982
15 Jul. 1982 497 p
(Contract DAAK70-81-C-0002)
(AD-A117962; Rept-50423) Avail: NTIS HC A21/MF A01 CSCL 13/11

This report summarizes the results obtained in evaluation 21 vane pumps from three different manufacturers on overall performance, accelerated life, 1000 hour endurance and thermal stability tests using clean oil. GRA

N83-11505# Sandia Labs., Albuquerque, N. Mex. Computational Physics and Mechanics Div.
RUNNOS AND RUNDEP: COMPUTER PROGRAMS FOR CALCULATING LOADS ON EARTH PENETRATORS
F. R. Norwood May 1982 22 p refs
(Contract DE-AC04-76DP-00789)
(DE82-016579; SAND-82-0963) Avail: NTIS HC A02/MF A01

The RUNNOS and RUNDEP which are computer codes for predicting penetrator performance are discussed. The RUNNOS may be used to compute total force and deceleration, plus normal stress distribution and the target penetrator gap along the length of the penetrator, while RUNDEP provides a history of deceleration as a function of penetration depth. The coding allows for ogival, conical and cylindrical regions of the penetrator, and accounts for possible separation and reattachment. The simplification of the input was accomplished both by fixing appropriately several of the input parameters and by modifying the coding accordingly. A wide choice of constitutive relations are provided, and the material constant required may be obtained from standard experimental material data. DOE

N83-11359# California Univ., Livermore. Lawrence Livermore Lab.
DIAMOND TURNING MACHINE NO. 3
D. L. Carter *In its* Mech. Eng. Res. Mar. 1982 p 10-12 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

N83-11361# California Univ., Livermore. Lawrence Livermore Lab.
ARC WELDING
C. S. Lanoram *In its* Mech. Eng. Res. Mar. 1982 p 20-24 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-11506*# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
PHENOMENOLOGICAL AND MECHANICS ASPECTS OF NONDESTRUCTIVE EVALUATION AND CHARACTERIZATION BY SOUND AND ULTRASOUND OF MATERIAL AND FRACTURE PROPERTIES Final Report
Li-Sheng W. Fu Washington NASA Oct. 1982 32 p refs
(Grant NsG-3269)
(NASA-CR-3623; NAS 1.26:3623) Avail: NTIS HC A03/MF A01 CSCL 14D

Developments in fracture mechanics and elastic wave theory enhance the understanding of many physical phenomena in a mathematical context. Available literature in the material, and fracture characterization by NDT, and the related mathematical methods in mechanics that provide fundamental underlying principles for its interpretation and evaluation are reviewed. Information on the energy release mechanism of defects and the interaction of microstructures within the material is basic in the formulation of the mechanics problems that supply guidance for nondestructive evaluation (NDE). A.R.H.

N83-11507*# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

FUNDAMENTAL ASPECTS IN QUANTITATIVE ULTRASONIC DETERMINATION OF FRACTURE TOUGHNESS: THE SCATTERING OF A SINGLE ELLIPSOIDAL INHOMOGENEITY Final Report

Li-Sheng W. Fu Washington NASA Oct. 1981 37 p refs
(Grant NsG-3269)
(NASA-CR-3625; NAS 1.26:3625) Avail: NTIS HC A03/MF A01 CSCL 14D

The scattering of a single ellipsoidal inhomogeneity is studied via an eigenstrain approach. The displacement field is given in terms of volume integrals that involve eigenstrains that are related to mismatch in mass density and that in elastic moduli. The governing equations for these unknown eigenstrains are derived. Agreement with other approaches for the scattering problem is shown. The formulation is general and both the inhomogeneity and the host medium can be anisotrophic. The axisymmetric scattering of an ellipsoidal inhomogeneity in a linear elastic isotropic medium is given as an example. The angular and frequency dependence of the scattered displacement field, the differential and total cross sections are formally given in series expansions for the case of uniformly distributed eigenstrains. Author

N83-11508# Rockwell International Science Center, Thousand Oaks, Calif.

QUALITY CONTROL AND NONDESTRUCTIVE EVALUATION TECHNIQUES FOR COMPOSITES. PART 1: OVERVIEW OF CHARACTERIZATION TECHNIQUES FOR COMPOSITE RELIABILITY Final Report, 1 Dec. 1980 - 15 May 1981

D. H. Kaelble Army Aviation Research and Development Command May 1982 79 p refs
(Contract DAAG29-80-C-0137)
(AD-A118410; SC5291.6FR-Pt-1; USAAVRADCOM-TR-82-F-3) Avail: NTIS HC A05/MF A01 CSCL 11/4

Advanced composite materials technology has undergone a fundamental transition in the last decade and is now implemented in a wide range of large scale primary structures ranging from composite helicopter rotor blades to composite cargo bay doors for Space Shuttle orbiter. Part of this technology development for composite reliability is a highly organized advancement in the methods and management of characterization methodologies. These characterization methodologies can be listed in the approximate order of their implementation as follows: Chemical Quality Assurance Testing; Processability Testing; Cure Monitoring and Management, Nondestructive Evaluation (NDE); Performance and Proof Testing; and Durability Analysis and Service Life Prediction. Author (GRA)

N83-11509# Georgia Inst. of Tech., Atlanta. Production and Distribution Research Center.

APPLICATIONS OF DUALITY AND STOCHASTIC DOMINANCE IN RELIABILITY THEORY

Michael Pinedo Jan. 1982 22 p refs
(Contract N00014-80-K-0709; Grant NSF ECS-81-15344)
(AD-A118085; PDRC-82-1) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper we discuss a notion which is the dual of the failure rate and is defined as f(t)/F(t). This concept has come up several times in the literature, but has never been investigated in detail. In this paper the name survival rate is used. We show that in many models of practical interest the survival rates of certain random variables have nice properties. This makes it possible to obtain bounds on the distribution functions of these random variables. Moreover, we show that a form of stochastic dominance based on the survival rates of the random variables has some interesting applications. Author (GRA)

N83-11510# Laboratoire Central des Ponts et Chaussees, Paris (France). Section des Nouvelles Methodes Physiques.

POSSIBILITIES OF USING THERMAL METHODS FOR NONDESTRUCTIVE TESTING IN CIVIL ENGINEERING: A SUMMARY OF THE LITERATURE

Jean Charrier and Jean-Antoine Marucic Apr. 1982 146 p refs In FRENCH; ENGLISH, GERMAN, SPANISH and RUSSIAN summaries Original contains color illustrations
(LPC-113; ISBN-2-7208-7150-8; ISSN-0222-8394) Avail: NTIS HC A07/MF A01

The potential for adaptation of nondestructive testing methods to civil engineering and building applications is assessed. The laws of the science of heat and of the interactions of heat with matter are presented together with the measuring instruments that are used, most of them based on IR radiation. The utilizations of thermal techniques are discussed. These are grouped by user and up-to-now unexploited domains of study are identified. Author (ESA)

N83-11511# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 9. Operational Research.

A STATISTICAL ANALYSIS OF FAILURES OF MILITARY TRANSPORT VEHICLES OCCURRING DURING TESTING BY MBA-2

G. Konstantis and H. P. G. vanOoijen Apr. 1982 29 p In DUTCH; ENGLISH summary
(Contract A79/KL/088)
(PhL-1982-10; TDCK-76389) Avail: NTIS HC A03/MF A01

An attempt was made to analyze the effect of average speed and loading weight on the defects of military transport vehicules occurring during tests on prototypes and pre-series. The analysis is based on testing statistical hypotheses, using nonparametric methods. The test distance was limited to 20,000 km. For a given route, the defects are independent of average speed and the defects dependent on the type of route. The Maastricht route can be simulated by a test bench. The defect failure rate is constant, probably due to vehicle maintenance. Author (ESA)

N83-11363# California Univ., Livermore. Lawrence Livermore Lab.

THERMOELASTIC ULTRASONIC NDE

J. L. Opsal, A. Rosencwaig, and W. W. Wilcox *In its* Mech. Eng. Res. Mar. 1982 p 32-37 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-11512# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

STABILITY OF A RECTANGULAR PLATE UNDER NONCONSERVATIVE AND CONSERVATIVE FORCES

S. Adali Jan. 1982 28 p refs
(CSIR-TWISK-245) Avail: NTIS HC A03/MF A01

Flutter and divergence instabilities of a rectangular plate with two independent loading parameters are studied. The plate is subjected to the combind action of a tangential follower force and a unidirectional axial force along one edge. Two opposite sides of the plate are simply suppoted, one side being clamped and the other being a free edge where the inplane forces act. Depending on the relative magnitudes of the follower and axial forces, the plate may lose its stability by flutter or divergence. The flutter problem is solved by maximizing the flutter load over the frequency and thereby obtaining the maximum point of an eigen-curve. The stability boundaries are given for plates with different aspect ratios. The effect of an elastic foundation on the stability boundaries are determined. The influence of Poisson's ratio on the flutter load and frequency is investigated. It is shown that no general rule can be formulated as to the effect of Poisson's ratio on the flutter load, and that this effect will vary according to the aspect ratio and axial load. S.L.

N83-11513*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHTWEIGHT RADIANTLY AND ACTIVELY COOLED PANEL: THERMAL AND STRUCTURAL PERFORMANCE
Charles P. Shore, Robert J. Nowak, and H. Neale Kelly Jan. 1982 53 p refs
(NASA-TP-2074; L-15292; NAS 1.60:2074) Avail: NTIS HC A04/MF A01 CSCL 20K

A 2- by 4-ft flightweight panel was subjected to thermal/structural tests representative of design flight conditions for a Mach 6.7 transport and to off-design conditions simulating flight maneuvers and cooling system failures. The panel utilized Rene 41 heat shields backed by a thin layer of insulation to radiate away most of the 12 Btu/ft2-sec incident heating. A solution of ethylene glycol in water circulating through tubes in an aluminum-honeycomb-sandwich panel absorbed the remainder of the incident heating (0.8 Btu/sq ft-sec). The panel successfully withstood (1) 46.7 hr of radiant heating which included 53 thermal cycles and 5000 cycles of uniaxial inplane loading of + or - 1200 lfb/in; (2) simulated 2g-maneuver heating conditions and simulated cooling system failures without excessive temperatures on the structural panel; and (3) the extensive thermal/structural tests and the aerothermal tests reported in NASA TP-1595 without significant damage to the structural panel, coolant leaks, or hot-gas ingress to the structural panel. Author

N83-11514*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BENDING-TORSION FLUTTER OF A HIGHLY SWEPT ADVANCED TURBOPROP
O. Mehmed, K. R. V. Kaza, J. F. Lubomski, and R. E. Kielb [1981] 24 p refs Prepared for presentation at the 1982 Aerospace Congr. and Exposition, Anaheim, Calif., 25-28 Oct., 1982; sponsored by the Soc. of Automotive Engr.
(NASA-TM-82975; E-1404; NAS 1.15:82975) Avail: NTIS HC A02/MF A01 CSCL 20K

Experimental and analytical results are presented for a bending-torsion flutter phenomena encountered during wind-tunnel testing of a ten-bladed, advanced, high-speed propeller (turboprop) model with thin airfoil sections, high blade sweep, low aspect ratio, high solidity and transonic tip speeds. Flutter occurred at free-stream Mach numbers of 0.6 and greater and when the relative tip Mach number (based on vector sum of axial and tangential velocities) reached a value of about one. The experiment also included two- and five-blade configurations. The data indicate that aerodynamic cascade effects have a strong destabilizing influence on the flutter boundary. The data was correlated with analytical results which include aerodynamic cascade effects and good agreement was found. Author

N83-11515# Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
STRUCTURAL BEHAVIOR OF CURVED BEAMS
A. Rosen and H. Abramovich Jun. 1981 74 p refs
(TAE-452) Avail: NTIS HC A04/MF A01

The equations of equilibrium which describe the three dimensional behavior of curved beams are derived. These equations include first order geometric nonlinear influences. The equations are solved by the Galerkin method. The method is very general and allows general variation of the geometric and structural properties along the beam. Any combination of boundary conditions is possible and the most general distribution of loads along the beam can be treated. Numerical results for a few examples are presented and compared to other theoretical and experimental results. The agreement between the results is generally good. It is shown that the Galerkin method is an efficient method which enables one to solve the problem using a small number of unknowns compared to other methods which are in use. M.G.

N83-11516# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
A PHOTOELASTIC STUDY OF LOAD DISTRIBUTIONS AND STRESSES IN MULTI-GROOVE CONNECTIONS OF THE SAME MATERIAL UNDER TENSION
Y. F. Cheng May 1982 23 p refs
(DA Proj. 1L1-61101-A-91A)
(AD-A118382; AD-E440155; ARLCB-TR-82013) Avail: NTIS HC A02/MF A01 CSCL 20/11

This report is a continuation of Technical Report ARLCB-TR-81008 and describes a three-dimensional photoelastic study on load distributions and stresses in multi-groove connections of the same material under tension. Two groove profiles were investigated, namely, the British Standard Buttress (BSB), and the new profile. It was found that in both profiles the maximum fillet stress (of)max does not occur at the groove root. Therefore, the narrowest transverse section is not the critical section. The critical stress, i.e., (of)max, in the new profile is higher than that in the BSB profile. Moreover, (of)max in the first groove is higher than in that subsequent grooves. Hence, the first groove is the critical region. In an ideal multi-groove (> 7) connection, the first two lugs could take approximately 50 and 60 percent of the load in the BSB and new profile, respectively. However, the ideal contact could not be expected due to machining tolerances. The worst possible case would occur when only one groove is in contact and the situation is reduced to a single-groove connection. Further work on the effect of different materials is in progress. GRA

N83-11517# Trinity Coll., Dublin (Ireland). Dept. of Civil Engineering.
NUMERICAL METHODS FOR CREEP ANALYSIS IN GEOTECHNICAL PROBLEMS Final Technical Report, Aug. 1976 - Dec. 1981
T. E. Glynn Dec. 1981 134 p refs
(Grant DA-ERO-76-G-063; DA Proj. 1T1-61102-BH-57)
(AD-A118234) Avail: NTIS HC A07/MF A01 CSCL 20/11

This report presents the results of a theoretical study of inelastic material behavior produced by static loading on a viscous continuum. A number of issues are addressed in an attempt to introduce inelastic behavior into piecewise numerical methods. Methods based on similitude and direct integration of the displacement field are investigated. Potential field theory is invoked as a means of describing stress distributions which are assumed invariant with respect to time of straining the material. No attempt has been made to include forced flow, strain hardening or frictional material properties. The analysis is restricted to slow deformations and results in a line integral for conversion of strain rate to displacement as a function of time of straining. The interpretation of experimental data is viewed from the stand-point of functional analysis as it is felt that this branch of mathematics has unexplored implications in the study of creep of deformable bodies.
Author (GRA)

N83-11518# Naval Postgraduate School, Monterey, Calif.
POSTBUCKLING BEHAVIOR OF GRAPHITE/EPOXY CLOTH SHEAR PANELS WITH 45 DEG FLANGED LIGHTENING HOLES M.S. Thesis
Richard John Herman Mar. 1982 165 p refs
(AD-A118272) Avail: NTIS HC A08/MF A01 CSCL 11/4

An experimental and finite-element analysis was performed on graphite/epoxy cloth plates subjected to static shear loading. Two specimens were tested to failure for each of three configurations: a solid panel, a panel with an unreinforced hole and a panel with a 45 deg-flanged hole. Both a static nonlinear analysis and a bifurcation-buckling analysis were performed for each of the panel configurations. GRA

N83-11519# Pennsylvania State Univ., University Park. Applied Research Lab.
VARIATION OF THE PINNING FORCE WITH MICROSTRUCTURE AND WITH THE GINSBURG-LANDAU PARAMETER IN TYPE 2 SUPERCONDUCTORS Ph.D. Thesis
Pedro J. Javier 1 Sep. 1981 177 p refs
(Contract N00024-79-C-6043)
(AD-A118288; ARL/PSU-TM-81-182) Avail: NTIS HC A09/MF A01 CSCL 20/11

The variation of the pinning force with microstructure and with

the Ginzburg-Landau parameter is studied for 53 vanadium and vanadium alloy specimens. Vanadium-carbide precipitates are used as pinning centers. The Ginzburg-Landau parameter is varied by alloying the vanadium with small quantities of gallium or niobium. Alloy compositions of V-0.20a/o Ga, V-1.05a/o Ga, V-2.96a/0 Ga, and V-4.01a/o Nb are used. GRA

N83-11520# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.
PRACTICAL APPLICATIONS OF FRACTURE MECHANICS IN AIRCRAFT AND AEROSPACE STRUCTURAL PROBLEMS
J. J. Kacprzynski Jun. 1982 36 p refs In ENGLISH; FRENCH summary
(AD-A118321; NAE-LR-611; NRC-20415) Avail: NTIS HC A03/MF A01 CSCL 20/11

Two computer programs, CRACKS-4 and FLAGRO 4, used for the analysis of crack growth in aircraft and aerospace structures are reviewed. The merits and limitations of each program are described using practical numerical examples. Requirements for the next generation of computer programs are specified. M.G.

N83-11521# Rockwell International Corp., Los Angeles, Calif. Aircraft Operations Div.
IMPROVED METHODS FOR PREDICTING SPECTRUM LOADING EFFECTS. VOLUME 1: TECHNICAL SUMMARY Final Report, 16 Jan. 1979 - 30 Nov. 1981
James B. Chang, R. M. Hiyama, and M. Szamossi Wright-Patterson AFB, Ohio AFWAL Oct. 1981 218 p refs 2 Vol.
(Contract F33615-77-C-3121; AF Proj. 2401)
(AD-A118295; NA-81-234-Vol-1; AFWAL-TR-81-3092-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 01/3

This report presents the technical details of improved methods for predicting the load interaction effects on crack growth under flight spectrum loading developed in a research effort sponsored by the USAF. These incude the cycle-by-cycle crack-growth prediction methods used in the detail design stage, the flight-by-flight crack-growth analysis method for individual aircraft tracking usage, and preliminary design trade-off studies. GRA

N83-11522# Stanford Univ., Calif. Div. of Applied Mechanics.
FINITE DEFORMATION EFFECTS IN PLASTICITY ANALYSIS Interim Technical Report
E. H. Lee (Rensselaer Poytechnic Inst.) Apr. 1982 17 p refs
(Contract N00014-81-K-0660)
(AD-A118434) Avail: NTIS HC A02/MF A01 CSCL 20/11

The non-linear kinematics of the combination of elastic and plastic deformations at finite strain provides the mathematical structure to examine aspects of elastic-plastic analysis more succinctly than is possible with the approach based on infinitesimal elastic strain. Kinematic hardening represents the anisotropic component of strain hardening by a back stress alpha. Application of current theory for finite deformation incorporates the effect of finite rotation by using the Jaumann derivative in the evolution equation for alpha. This approach predicts oscillating shear stress for monotonically increasing simple shear strain but this anomaly can be eliminated by adopting a physically more meaningful modified Jaumann derivative. Author (GRA)

N83-11523# Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Strukturberechnung.
INELASTIC BUCKLING OF COLUMNS OF L AND U CROSS SECTIONS
Rolf Zick 28 May 1982 28 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-82-12) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 12,70

The buckling stresses of axially compressed columns with U and L cross sections are determined, using flow and deformation theory. Deflections of the cross sectional elements are described by the plate equation and the linearized differential equation for in-plane deformations. The results of both calculations are compared and show that, if the domain around the yield point is excluded, there is only a difference to within the scattering of the test results. Author (ESA)

N83-11524# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ELLIPTICAL HOLES AND INCLUSIONS IN ORTHOTROPIC PLATES
G. J. Spies Mar. 1982 17 p refs
(VTH-LR-349) Avail: NTIS HC A02/MF A01

Simple expressions are recalled for the stress distribution around circular holes and circular inclusions in orthotropic plates under a variety of loads. Some of these cases are generalized to elliptical shapes. The expressions found are presented; they are only slightly more complicated than those which are reviewed and can be worked out with a pocket calculator. The stresses are given at the boundary and on the principal axes; they are not approximations, but exact solutions. Author (ESA)

N83-11525# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE INFLUENCE OF FRICTION ON THE THEORETICAL STRENGTH OF PIN-LOADED HOLED ORTHOTROPIC PLATES
T. deJong Mar. 1982 43 p refs
(VTH-LR-350) Avail: NTIS HC A03/MF A01

Stresses were calculated for infinite orthotropic plates with a circular hole, loaded by a perfectly fitting rigid pin. The effect of friction at the interface between pin and plate material is evaluated. The calculations are based on the analytical method of complex stress functions. A numerical approach was used for satisfying the boundary conditions of the contact area between pin and hole. Stress concentration factors, based on the nominal bearing stress, are presented graphically for five laminates of carbon fiber reinforced plastic. A quadratic failure criterion was used to predict the bearing stress at which first significant damage occurs. The results indicate that the presence of friction has a significant influence on the stress distribution around a pin-loaded hole. Author (ESA)

N83-11526# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
OVERALL BUCKLING OF SPECIALLY ORTHOTROPIC Z-STIFFENED PANELS. PART 1: THEORY
J. W. Gunnink Apr. 1982 41 p refs
(VTH-LR-351-Pt-1) Avail: NTIS HC A03/MF A01

A method is presented for the calculation of the buckling load of Z-stiffened panels built up from specially orthotropic laminated plates. This method is an extenstion of Van der Neut's method of calculating the overall buckling load of Z-stiffened panels of isotropic material. Author (ESA)

N83-11527# Cambridge Univ. (England). Dept. of Engineering.
ON THE FORMULATION OF THE POWER-LAW CREEP EQUATION
A. M. Brown and M. F. Ashby Feb. 1980 14 p refs
(PB82-189093; CUED/C/MATS/TR-62-1980) Avail: NTIS HC A02/MF A01 CSCL 11F

A power law creep equation is presented. It is supported by a large body of power law creep data for metals and ceramics. GRA

N83-11528# Sydney Univ. (Australia). School of Civil and Mining Engineering.
MOMENT ROTATION CHARACTERISTICS OF FLAT PLATE AND COLUMN SYSTEMS
J. F. Mulcahy and J. M. Rotter Dec. 1981 35 p refs
(PB82-194051; R-404) Avail: NTIS HC A03/MF A01 CSCL 20K

It is noted that the response of flat plate and column structures to lateral loading is closely associated with the stiffness of the slab/column joints. The nonlinear behavior of concrete slab/column joints is examined. Results from experiments on reinforced concrete models are presented. These tests show a nonlinear response from very low load levels. The behavior of the test specimens is compared with both linear elastic and empirical predictions. The results are also compared with an equivalent slab derived from

the Equivalent Frame Method. This is found to give a closer description of the observed behavior than the elastic theories.
M.G.

N83-11529# Sydney Univ. (Australia). School of Civil and Mining Engineering.
BUCKLING OF BEAMS WITH CONCENTRATED MOMENTS
P. E. Cuk and N. S. Trahair Sep. 1981 40 p refs Sponsored in part by Australian Research Grants Committee
(PB82-194069; R-401) Avail: NTIS HC A03/MF A01 CSCL 20K

It is noted that present methods for approximating the elastic lateral buckling load of a continuous beam are unnecessarily conservative when the beam is loaded by concentrated moments because the significant warping restraints which may develop at points of concentrated moment are neglected. An improved approximate method is developed which allows for these warping restraints. The method uses an effective length concept to allow for the warping and minor axis flexural interactions between adjacent segments at brace points and supports. The warping restraint effective length factors are estimated from the concentrated moments and the antisymmetry of the bending moment distribution about the brace point, and initial estimates are made of the buckling loads of the individual segments. These estimates are then improved by allowing approximately for the flexural interaction between adjacent seqments. The accuracy of the method is demonstrated, and a detailed example of its use is given.
M.G.

N83-11530# California Inst. of Tech., Pasadena. Earthquake Engineering Research Lab.
STRAIN-SPACE PLASTICITY THEORY AND NUMERICAL IMPLEMENTATION Ph.D. Thesis
Paul Jerome Yoder Aug. 1980 150 p refs
(Grant NSF PFR-77-23687)
(PB82-201682; EERL-80-07; NSF/RA-800639) Avail: NTIS HC A07/MF A01 CSCL 20K

An alternate version of plasticity which closely parallels the traditional theory but interchanges the roles of stress and strain is presented. The new formulation gives stress as a functional of strain. In the case of a single loading surface, the two versions of plasticity are equivalent when the model parameters are appropriately selected. A similar result is obtained for formulations involving a plurality of loading surfaces. The strain space formulation is coded for numerical solution, with provision for a variable number of loading surfaces. The numerical algorithm is tested for accuracy in the handling of perfect plasticity, and the results are compared with those of three commonly used stress space algorithms. The new algorithm is interfaced with a finite element code and used to study the response of a foundation resting on an elastoplastic half space.
GRA

N83-11531# Sydney Univ. (Australia). Labs. of Civil Engineering.
STRUCTURAL ANALYSIS OF ASSEMBLAGES OF THIN-WALLED MEMBERS
A. H. Baigent and G. J. Hancock Jun. 1981 45 p refs Sponsored in part by Australian Research Grants Committee
(PB82-187253; R-389) Avail: NTIS HC A03/MF A01 CSCL 20K

A matrix method for the analysis of structural systems composed of thin-walled members is presented. The matrix displacement analysis includes the effects of thin-walled non-uniform torsion theory, cross section asymmetry, and eccentric restraint as well as joint types peculiar to thin-walled members. The method is used for a prediction of the elastic behavior of a set of representative test frames. The test frames were pitched-roof portals constructed from channel sections bent about their major axis and supported by eccentric restraints simulating purlins and girts.
M.G.

N83-11038# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A NEW SIMULTANEOUS ITERATION ALGORITHM FOR EVALUATION OF EIGENPROBLEMS IN LARGE STRUCTURES
Liu Guoguang and Li Junjie *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 33-45 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-11039# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOME PROBLEMS OF PLATE BENDING HYBRID MODEL WITH SHEAR EFFECT
Wu Changchun *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 46-60 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34641 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-11040# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A LOCAL STRAIN FATIGUE ANALYSIS METHOD AND COMPUTER PROGRAM
Wu Yisheng *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 61-74 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 Document also announced as A82-34642 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-11357# Electronic Systems Div., Hanscom AFB, Mass.
TEMPERATURE AND RATE EFFECTS ON ELASTIC-PLASTIC FRACTURE BEHAVIOR
Ronald D. Streit and Alfred Goldberg *In* California Univ., Lawrence Livermore Lab. Mech. Eng. Res. Mar. 1982 p 5-7 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

N83-11358# California Univ., Livermore. Lawrence Livermore Lab.
NONLINEAR DEFORMATION OF ELASTOMERIC CUSHIONS
R. M. Christensen and W. W. Feng *In its* Mech. Eng. Res. Mar. 1982 p 8-9 (For primary document see N83-11355 02-31)
Avail: NTIS HC A03/MF A01

42 GEOSCIENCES (GENERAL)

N83-11532# National Advisory Committee on Oceans and Atmosphere, Washington, D.C.
A REPORT TO THE PRESIDENT AND THE CONGRESS Annual Report
30 Jun. 1982 58 p refs
(AR-11) Avail: NTIS HC A04/MF A01

Atmospheric and marine issues of immediate and long-term consequence are reported. Remote sensing equipment, instrumented airplanes, and computers were examined. River and flood forecasting research is discussed. Funding for civil weather services is also discussed. Marine fisheries, minerals, and transportation are considered. Scientific diving standards and regulations, the Clean Water Act, ocean waste disposal, outer continental shelf revenue sharing, coastal barrier legislation, the Coast Guard, global oceanic processes, acid rain, and radioactive waste disposal are considered.
Author

N83-11533# Council for Scientific and Industrial Research, Pretoria (South Africa).
NATIONAL GEOSCIENCE PROGRAMME. THE EVOLUTION OF EARTH RESOURCE SYSTEMS
Jun. 1981 50 p
(Rept-49) Avail: NTIS HC A03/MF A01

Existing knowledge in the field of ore genesis in the different geological environments (igneous, metamorphic and sedimentary)

is analyzed and deficiencies are highlighted. Available geological maps are reviewed and maps still required are identified. The research and exploration techniques currently being applied in South Africa are outlined and areas which require more research and development are discussed. To ensure an integrated coordinated research effort, seven sub-programs embodying some of the major problems are considered. Priority areas for research are noted and described. A guide for participants in the program, including a code of conduct and a format for project proposals and for the reporting of research results is included. A.R.H.

N83-11534*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ATMOSPHERIC EFFECTS AND POTENTIAL CLIMATIC IMPACT OF THE 1980 ERUPTIONS OF MOUNT ST. HELENS
Adarsh Deepak, ed. Washington Oct. 1982 296 p refs Symp. held at Washington, D.C., 18-19 Nov. 1980
(NASA-CP-2240; L-15488; NAS 1.55:2240) Avail: NTIS HC A13/MF A01 CSCL 04B

Measurements and studies of the 1980 Mount St. Helens volcanic eruptions and their atmospheric effects and climatic impact are addressed. Specific areas discussed include: (1) nature and impact of volcanic eruptions; (2) in situ measurements of effluents; (3) remote sensing measurements; (4) transport and dispersion of volcanic effluents; (5) chemistry of volcanic effluents; and (6) weather and potential climate impact. For individual titles, see N83-11535 through N83-11562.

N83-11535*# Michigan Technological Univ., Houghton.
THE 18 MAY 1980 ERUPTION OF MOUNT ST. HELENS: THE NATURE OF THE ERUPTION, WITH AN ATMOSPHERIC PERSPECTIVE **c46**
William I. Rose, Jr. and M. F. Hoffman *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 1-14 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08K

Mount St. Helens erupted somewhat less than 0.5 cu km of magma (dense rock equivalent) on May 18, 1980. The May 18 event was usually violent. As much 35% of the volume of the airfall material fell outside of the 2.5 mm isopach, which encloses about 88,000 sq km. This extraordinary dispersive power was transmitted by an eruption column which reached heights of more than 20 km. There was a lateral blast (or surge) of unusually large dimensions associated with the onset of the eruption. The magma is dacitic in composition and had a low (< 500 ppm) sulfur content. Distal ashes contain much nonmagmatic (lithic) material, but smaller (< 50 microns m) particles are mostly finely divided magmatic dacite. The grain size distributions of the ash are multimodal, frequently with peaks at 90, 25, and 10 microns. The finer populations fell out faster than their terminal velocities as simple particles would suggest. It is inferred that large proportions of the fine ash fell out as composite particles. This condition greatly reduces the atmospheric burden of silicate particles. Some of the unusual aspects (violence, intense surges, multimodal grain size distributions, lithic content of the ashes) of the eruption may be due to its phreatomagmatic character. The hydrothermal system above the magma may have infiltrated the magma body at the onset of the eruption. An 'overprint' of the geochemistry of this hydrothermal system on the geochemistry of the magmatic gas system is likely. One important feature is that reduced gas species may be much more abundant than in many eruptions. Another is that fine ash may form aggregates more readily. Author

N83-11536*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VOLCANOES AND CLIMATE **c47**
Owen B. Toon *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 15-36 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

The evidence that volcanic eruptions affect climate is reviewed. Single explosive volcanic eruptions cool the surface by about 0.3 C and warm the stratosphere by several degrees. Although these changes are of small magnitude, there have been several years in which these hemispheric average temperature changes were accompanied by severely abnormal weather. An example is 1816, the 'year without summer' which followed the 1815 eruption of Tambora. In addition to statistical correlations between volcanoes and climate, a good theoretical understanding exists. The magnitude of the climatic changes anticipated following volcanic explosions agreees well with the observations. Volcanoes affect climate because volcanic particles in the atmosphere upset the balance between solar energy absorbed by the Earth and infrared energy emitted by the Earth. These interactions can be observed. The most important ejecta from volcanoes is not volcanic ash but sulfur dioxide which converts into sulfuric acid droplets in the stratosphere. For an eruption with its explosive magnitude, Mount St. Helens injected surprisingly little sulfur into the stratosphere. The amount of sulfuric acid formed is much smaller than that observed following significant eruptions and is too small to create major climatic shifts. However, the Mount St. Helens eruption has provided an opportunity to measure many properties of volcanic debris not previously measured and has therefore been of significant value in improving our knowledge of the relations between volcanic activity and climate. Author

N83-11537*# Washington State Univ., Pullman.
IMPACT OF MOUNT ST. HELENS ERUPTION ON ECOSYSTEMS **c45**
J. C. Engibous, L. K. Bustad, R. A. Kennedy, G. O. Klock, E. C. Klostermeyer, and R. P. Preston *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 37-42 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

The impact of the May 18, 1980 Mount St. Helens eruption on ecosystems is discussed. Special attention is given to its effect on soils, crops, insects, animals, and forests. L.F.M.

N83-11538*# Geological Survey, Arvada, Colo. Water Resources Survey.
IMPACT OF MOUNT ST. HELENS ERUPTION ON HYDROLOGY AND WATER QUALITY **c43**
Joe E. Bonelli, H. E. Taylor, and J. M. Klein *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 43-46 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08H

The 1980 eruptions of Mount St. Helens in southeast Washington resulted in a pronounced effect on the surface and ground water resources of the state. In response to the volcanic activity, the U.S. Geological Survey intensified statewide surface and ground water sampling programs to determine the nature and magnitude of the volcanic-induced variations. Streams to the east of Mount St. Helens received the major ash fallout. Chemical effects were best noted in smaller streams sampled 60 to 70 miles northeast of Mount St. Helens. The chemical variations observed were pronounced but short lived. Sulfate and chloride increases in anionic composition were prevalent immediately following the eruption; however, the original bicarbonate predominance was again attained within several days. Suspended iron and aluminum concentrations were similarly elevated during the period of greatest ash deposition (highest turbidity); however, the dissolved concentrations remained relatively constant. Depressions of pH were minor and short lived. Streams draining to the south, tributaries to the Columbia river, showed little observable changes in water chemistry. Streams draining to the west (Toutle river and its tributaries) were compositionally affected by the various volcanic activities. Chloride and sulfate anion percentage exceeded the bicarbonate percentage up to one month following the eruption period. Streams and lakes sampled in the immediate vicinity of Mount St. Helens, in addition to trace metals, contained organic compounds derived from decomposing wood buried in the debris deposits. This organic

material may constitute a significant source of organic compounds to surface and ground water for some time to come. Author

N83-11539*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PRECURSOR GASES OF AEROSOLS IN THE MOUNT ST. HELENS ERUPTION PLUMES AT STRATOSPHERIC ALTITUDES **c46**
Edward C. Y. Inn, J. F. Vedder, E. P. Condon, and D. O'Hara (LFE Corp.) *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 47-54 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

Nineteen stratospheric samples from the eruption plumes of Mount St. Helens were collected in five flight experiments. The plume samples were collected at various altitudes from 13.1 to 20.7 km by using the Ames cryogenic sampling system on board the NASA U-2 aircraft. The enriched, cryogenically collected samples were analyzed by chromatography. The concentrations of aerosols precursor gases (OCS, SO2, and CS2), CH3Cl, N2O, CF2Cl2, and CFCl3 were measured by gas chromatography. Large enhancement of the mixing ratio of SO2 and moderate enhancement of CS2 and OCS were found in the plume samples compared with similar measurement under pre-volcanic conditions. A fast decay rate of the SO2 mixing ratio in the plume was observed. Measurement of Cl(-), SO2(2-), and NO3(-) by ion chromatography was also carried out on water solutions prepared from the plume samples. The results obtained with this technique imply large mixing ratios of HCl, (NO + NO2 + HNO3), and SO2, in which these constituents are the respective sources of the anions. Measurement of the Rn222 concentration in the plume was made. Other stratospheric constituents in the plume samples, such as H2O, CO2, CH4, and CO, were also observed. Author

N83-11540*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TIME VARIATIONS OF AEROSOLS IN THE STRATOSPHERE FOLLOWING MOUNT ST. HELENS ERUPTIONS **c46**
Neil H. Farlow, Kenneth G. Snetsinger, Verne R. Oberbeck, Guy V. Ferry, George Polkowski, and Dennis M. Hayes *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 55-64 refs Prepared in cooperation with LFE Corp. (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

Samples of stratospheric aerosols collected with U-2 aircraft for several months following the first three major eruptions of Mount St. Helens were analyzed for ash and liquid acid content. Ash grain sizes and compositions vary depending on collection altitude, location within the drifting cloud, and days following their injection. Differing volume percentages of major ash components such as glass, plagioclase, hornblende, and pyroxene emphasize the inhomogeneity of the clouds. Size distributions of ash particles vary with altitude. Generally small particles are depleted more rapidly at low altitudes (12 km) than at higher altitudes (17-18 km). Although samples collected 1 day after the first eruption of May 18, 1980, were dry, flow marks on the aircraft indicated parts of the cloud contained heavy acid concentrations. Indeed, all other samples obtained within 1 to 4 days after later eruptions (May 25 and June 12, 1980) were covered with copious amounts of liquid acid. Proportions of liquid to ash varied considerably depending on sampling location and cloud age. Because the acid-coated ash globules were large, they rapidly fell from the stratosphere until, by late June 1980, only a residue of acid droplets remained. Size distributions and concentrations of these droplets varied considerably. Author

N83-11541*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
DUSTSONDE MEASUREMENTS OF THE MOUNT ST. HELENS VOLCANIC DUST CLOUD OVER WYOMING **c45**
James M. Rosen and D. J. Hofmann *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 65-82 refs Sponsored in part by NSF, NOAA, and ONR (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

Numerous balloon soundings of the aerosol and condensation nuclei (CN) concentrations were made over Laramie, Wyoming following the eruption of Mount St. Helens in May of 1980. On several occasions the volatility of the particles was tested. In addition, special instrumentation was used to observe the evolution of particle size after the eruption. The particles in the initial cloud were relatively large and nonvolatile. In a relatively short time, however, the aerosol began showing a dominant volatile component. Although there were probably no CN in the original cloud due to the expected very short coagulation life time, high concentrations of unusually small CN particles were observed about a month after the eruption. By the end of September the CN profiles and associated particle size were practically back to normal. At present the aerosol particles show about a three times larger concentration than before the eruption, most of the new material being in a layer centered around 19 km. The net effect of the more recent series of eruptions during the last half of October 1980 seems to be negligible. Author

N83-11542*# Los Alamos Scientific Lab., N. Mex.
PHYSICAL AND CHEMICAL CHARACTERISTICS OF MOUNT ST. HELENS AIRBORNE DEBRIS **c45**
W. A. Sedlacek, G. H. Heiken, Eugene J. Mroz, E. S. Gladney, D. R. Perrin, Robert Leifer, I. Fisenne, L. Hinchliffe, and R. L. Chuan *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 83-107 refs Previously announced as N81-20613 Prepared in cooperation with DOE, New York and Chuan (R. L.) (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

Tephra and aerosols from the May 18, 1980 eruption of Mount St. Helens, Washington were sampled in the lower stratosphere with a WB-57F aircraft. The main body of the plume was intercepted over western Kansas on May 20, 48 hours after the eruption, at an altitude of 15.2 km. Concentrations on filter samples were 26 ng of SO4(-2) of air and 579 ng of ash/g of air. Angular glass pyroclasts ranged in size from 0.5 to 10 microns, with a mean grain of 2 microns. Samples collected at altitudes of 16.7 and 12.5 km had only traces of SO4(-2) and ash. A second flight was flown, 72 hours after the eruption, on May 21. From north Texas to central Wyoming, at an altitude of 15.2 km less than 0.5 to 38 ng of ash/g of air and 1.0 to 2.2 ng of SO4(-2)/g of air were sampled. At an altitude of 18.3 km, from central Wyoming to NW New Mexico, the plume density and character were variable. Author

N83-11543*# Institute for Atmosphere Optics and Remote Sensing, Hampton, Va.
SAGE MEASUREMENTS OF MOUNT ST. HELENS VOLCANIC AEROSOLS **c45**
G. S. Kent *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 109-115 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

The SAGE satellite system was used to make measurements on the optical extinction produced by stratospheric aerosols from the Mount St. Helens eruption. Two periods of observation were analyzed. In the first period (May 21 to 31, 1980), SAGE moved southward from latitude 60 N, and crossed the United States approximately one week after the May 18th eruption. Enhancements in stratospheric extinction were confined to latitudes between about 55 N and 25 N and longitudes between 10 W and 140 W. Individual layers were observed up to altitudes of 23 km. The geographical location of these layers corresponded closely to that expected on the basis of high-altitude meteorological data. During June and much of July, SAGE was, by reason of its geographical position and other orbital characteristics, unable to make further measurements on the northern hemisphere. Between July 19th and August 12th a second southward pass over the northern

hemisphere occurred and further observations were made. The volcanic aerosol in the stratosphere was now found to be widely distributed over the hemisphere, the maximum concentrations being north of 50 N. The aerosol showed considerable inhomogeneity and had reached as far south as 15 N but little, if any, had crossed the equator into the southern hemisphere. Individual layers at different heights were still distinguishable. The total stratospheric aerosol loading on this occasion appeared to be greater than in May and corresponded to an increase in global stratospheric mass of between 50 and 100 percent. R.J.F

N83-11544*# National Oceanic and Atmospheric Administration, Boulder, Colo.

MEASUREMENTS OF STRATOSPHERIC AEROSOLS OVER MAUNA LOA, HAWAII AND BOULDER, COLORADO c46

John J. Deluisi, Bernard G. Mendonca, and Kirby J. Hanson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 117-123 refs (For primary document see N83-11534 02-42)

Avail: NTIS HC A13/MF A01 CSCL 04A

The direct solar radiation transmission record at Mauna Loa, dating from 1958 to the present, revealed with remarkable precision the presence of stratospheric aerosol from volcanic activity. This record can be used to quantify the intensity of the stratospheric volcanic aerosol perturbation following a significant eruption in reference to the Agung event in 1963. The Mount St. Helens' stratospheric cloud was first detected by lidar at 18 km over Mauna Loa on 17 July. The atmospheric transmission was seen to decrease slightly after that time, but only a few tenths of 1 percent. Although it is still fairly early to draw a definite conclusion on the ultimate magnitude of the Mount St. Helens stratospheric aerosol from the Mauna Loa results, it can be stated that the stratospheric aerosol optical depth presently observed is comparable with that observed from Fuego which erupted in 1974. At Boulder, Colorado, the atmospheric debris from Mount St. Helens was observed by lidar on a number of occasions. Also, observations of the diffuse, total and direct transmission of solar radiation were made on June 3 and 4. The latter set of observations is useful for deriving information on the scattering properties of the volcanic cloud. The lidar and solar radiation data are presented and some of their special features are discussed. Author

N83-11545*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

GROUND-BASED AND AIRBORNE MEASUREMENTS OF THE MOUNT ST. HELENS STRATOSPHERIC EFFLUENTS c45

M. P. McCormick *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 125-130 refs (For primary document see N83-11534 02-42)

Avail: NTIS HC A13/MF A01 CSCL 13B

Shortly after the 18 May eruption, a series of airborne lidar flights were made over the Eastern United States. During the same period, ground-based systems were activated throughout the world. The available worldwide lidar data is put together in a consistent set. These data show the dispersion of material at different altitudes during the early global circuits. The material in the lower stratosphere and upper troposphere was very patchy in horizontal extent with backscattering ratio values over the east coast of the United States greater than 100 at the ruby wavelength of 0.6943. Two wavelength ratios and depolarization values for the material in the lower stratosphere (12 to 18 km) appear to have returned to the pre-18 May values within a month after the eruption and this indicated a rapid conversion to spherical shapes and normal indices of refraction. The material above 20 km moved slowly westward while most of the ejecta moved eastward at various speeds and directions which varied considerably with altitude. The westward material was detected first by the Japanese lidar system and then subsequently by the European and American ground-based systems. It circuited the globe in about 60 days. An airborne lidar flight in early September across the continental United States showed the layers to have homogenized considerably one broad layer between about 14 and 21 km peaking at 18 to 19 km and another more intermittent thin layer between 21 and 22 km. The ruby peak backscattering ratio of the broad layer was between 1.3 and 1.5. R.J.F.

N83-11546*# National Meteorological Center, Washington, D.C. Climate Analysis Center.

DISTRIBUTION OF MOUNT ST. HELENS DUST INFERRED FROM SATELLITES AND METEOROLOGICAL DATA c47

James D. Laver *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 131-140 refs (For primary document see N83-11534 02-42)

Avail: NTIS HC A13/MF A01 CSCL 04B

Visible and infrared pictures from two Geostationary Operational Environmental Satellite Systems satellites, in circular orbits at about 19,000 nautical miles, are available continuously at approximately 30 minute intervals. Still pictures and film loops from this system vividly depict the events associated with the May 18, 1980 eruption of Mount St. Helens. The initial explosion, shock wave, and visible horizontal dust distribution during the following week are readily apparent. Meteorological wind and height fields permit the inference of the vertical distribution of volcanic dust as well as explain the atmospheric behavior which caused the visible and nonvisible dust distribution. Author

N83-11547*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MOUNT ST. HELENS PLUME DISPERSION BASED ON TRAJECTORY ANALYSES c45

Edwin F. Danielsen *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 141-153 (For primary document see N83-11534 02-42)

Avail: NTIS HC A13/MF A01 CSCL 13B

The major eruption of Mount St. Helens on 18 May 1980, had sufficient energy to traverse the troposphere (9 km above the mountain top) and to penetrate an additional 10 km into the stratosphere. This plume, initially quasi-vertical, rapidly acquired the horizontal momentum of the environmental winds and suffered differential rotation due to a positive speed shear in the troposphere and a negative shear in the stratosphere. Advected rapidly eastward by the undulating jet stream, the lower stratospheric portion of the plume circled the globe at an average speed of approx. 25 m s/l, reentering North America over California in early June. During the same period, the uppermost portion slowly looped over the northwestern United States and then moved westward over the northern Pacific Ocean. Thus, plume dispersion was initiated by the vertical shears of the horizontal winds which converted a nearly vertical plume to a thin, quasi-horizontal, quasi-zonal lamina. Horizontal shears then dispersed the lamina meridionally while small-scale, wave turbulent motions spread it slowly vertically. Author

N83-11548*# National Center for Atmospheric Research, Boulder, Colo.

A COMPARISON OF CONSTITUENTS OF MOUNT ST. HELENS ERUPTION CLOUDS WITH THOSE OF SOME OTHER VOLCANOES c45

Richard D. Cadle and Leroy Heidt *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 155-159 refs Sponsored in part by NSF (For primary document see N83-11534 02-42)

Avail: NTIS HC A13/MF A01 CSCL 13B

Gases from Mount St. Helens were collected from the eruption clouds using an airplane during the period April 2 to April 8, 1980, and were analyzed for CO2, H2, CH4, and COS. The results were of similar magnitude to those obtained from magmatic eruptions in Central America. Thus, although the eruptions were evidently largely phreatic, magmatic gases may have played a larger role in these early small eruptions than has generally been believed. Electron micrographs of ash particles collected from the Mount St. Helens eruption clouds showed that the particles were for the

most part much larger than those from the Central American eruptions. Author

N83-11549*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION STUDIES OF THE PHYSICAL AND CHEMICAL PROCESSES OCCURRING IN THE STRATOSPHERIC CLOUDS OF THE MOUNT ST. HELENS ERUPTIONS OF MAY AND JUNE 1980 c46
Richard P. Turco (R and D Associates), Owen B. Toon, C. Whitten, R. G. Keesee, and P. Hamill (Systems and Applied Sciences Corp.) *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 161-189 refs (For primary document see N83-11534 02-42)
(Contract NAS2-9881)
Avail: NTIS HC A13/MF A01 CSCL 04A

The large and diverse set of observational data collected in the high-altitude clouds of May 18, May 25, and June 13, 1980 was organized and analyzed for trends which reveal the processes at work. The data were used to guide and constrain model simulations of the volcanic eruptions. A comprehensive one-dimensional model of stratospheric sulfate aerosols, sulfur precursor gases, and volcanic ash and dust particles is utilized which accounts for homogeneous and heterogeneous chemistry in the clouds, aerosol nucleation and growth, and cloud expansion. Computational results are given for the time histories of the gaseous species concentrations, sulfate aerosol size dispersions, and ash burdens in the eruption clouds. The long-term buildup of stratospheric aerosols in the Northern Hemisphere and the persistent effects of injected chlorine and water vapor on ozone are discussed. It is concluded that SO2, water vapor, and ash are the most important substances injected by the volcano into the stratosphere, with respect to both the widespread effects on composition and the impact on climate. It is found that the volcano probably had little influence on the climate (< 0.05 K global surface cooling) or on stratospheric ozone (< 0.2 percent maximum hemispherical reduction). A.R.H.

N83-11550*# Wisconsin Univ., Madison. Center for Climatic Research.
THE CLIMATIC EFFECT OF EXPLOSIVE VOLCANIC ACTIVITY: ANALYSIS OF THE HISTORICAL DATA c47
Reid A. Bryson and B. M. Goodman *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 191-202 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

By using the most complete available records of direct beam radiation and volcanic eruptions, an historical analysis of the role of the latter in modulating the former was made. A very simple fallout and dispersion model was applied to the historical chronology of explosive eruptions. The resulting time series explains about 77 percent of the radiation variance, as well as suggests that tropical and subpolar eruptions are more important than mid-latitude eruptions in their impact on the stratospheric aerosol optical depth. The simpler climatic models indicate that past hemispheric temperature can be stimulated very well with volcanic and CO2 inputs and suggest that climate forecasting will also require volcano forecasting. There is some evidence that this is possible some years in advance. Author

N83-11551*# University of Western Washington, Bellingham. Office of the State Climatologist.
PROBLEMS IN THE CLIMATOLOGY OF THE 1980 MOUNT ST. HELENS ERUPTIONS c47
Howard J. Critchfield *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 203-209 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

A brief review of the effects of climate and weather on the 1980 Mount St. Helens eruptions and the subsequent dispersion of ash and gases and the reciprocal influences of the eruptions on climate and climatology is presented. The effects of mesoscale destruction of snow fields and vegetation, a revised mountain profile, and ash deposits are addressed along with impacts on hemispheric climate and disruption of normal climatological observations, in the areas directly affected by the explosions and ashfall. Environmental and economic consequences are also considered. J.M.S.

N83-11552*# New York State Univ., Albany. Atmospheric Sciences Research Center.
THE MECHANISMS OF FINE PARTICLE GENERATION AND ELECTRIFICATION DURING MOUNT ST. HELENS VOLCANIC ERUPTION c46
Roger J. Cheng *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 211-217 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08K

Microscopical investigation of volcanic ash collected from ground stations during Mount St. Helens eruptions reveal a distinctive bimodel size distribution with high concentrations of particle ranges at (1) 200-100 microns and (2) 20-0.1 microns. Close examination of individual particles shows that most larger ones are solidified magma particles of porous pumice with numerous gas bubbles in the interior and the smaller ones are all glassy fragments without any detectable gas bubbles. Elemental analysis demonstrates that the fine fragments all have a composition similar to that of the larger pumice particles. Laboratory experiments suggest that the formation of the fine fragments is by bursting of glassy bubbles from a partially solidified surface of a crystallizing molten magma particle. The production of gas bubbles is due to the release of absorbed gases in molten magma particles when solubility decreases during phase transition. Diffusion cloud chamber experiments strongly indicate that sub-micron volcanic fragments are highly hygroscopic and extremely active as cloud condensation nuclei. Ice crystals also are evidently formed on those fragments in a supercooled (-20 C) cloud chamber. It has been reported that charge generation from ocean volcanic eruptions is due to contact of molten lava with sea water. This seems to be insufficient to explain the observed rapid and intense lightning activities over Mount St. Helens eruptions. Therefore, a hypothesis is presented here that highly electrically charged fine solid fragments are ejected by bursting of gas bubbles from the surface of a crystallizing molten magma particles. B.W.

N83-11553*# Atmospheric Environment Service, Downsview (Ontario).
MEASUREMENTS OF SO2 IN THE MOUNT ST. HELENS DEBRIS c45
J. B. Kerr, F. J. Evans, and C. L. Mateer *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 219-223 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

Routine measurements of ozone and SO2 are made with the Dobson and Brewer spectrophotometers at the Atmospheric Environment Service in Downsview Ontario. On May 20 and 21, 1980, large values of column SO2 were observed with both spectrophotometers at the time of passage of the Mount St. Helens debris. Enhanced SO2 values were first observed at 1800Z on May 20. The maximum column amount of SO2 measured was 0.06 cm at 2200 Z. On May 21, SO2 values slowly decreased from 0.03 cm at 1100 Z cm to 0.01 cm at 2000Z. Typical SO2 amounts due to pollution at the Downsview site are approximately 0.003 to 0.005 cm. At the same time of maximum SO2 enhancement, both Dobson and Brewer spectrophotometers measured a 0.040 cm decrease of total ozone. It is not clear whether the decrease of total ozone was caused by the volcanic cloud or natural ozone variability. Air mass trajectories indicate that the altitude of the debris cloud, which passed over Downsview at the time, was between 10 km and 12 km. Author

N83-11554*# Battelle Pacific Northwest Labs., Richland, Wash.
ASH LOADING AND INSOLATION AT HANFORD, WASHINGTON DURING AND AFTER THE ERUPTION OF MOUNT ST. HELENS **c46**
N. S. Laulainen *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 225-240 refs (For primary document see N83-11534 02-42)
(Contract DE-AC06-76RL-01830)
Avail: NTIS HC A13/MF A01 CSCL 08K

The effects of volcanic ash suspended in the atmosphere on the incident solar radiation was monitored at the Hanford Meteorological Station (HMS) subsequent to the major eruption of Mount St. Helens on May 18, 1980. Passage of the ash plume over Hanford resulted in a very dramatic decrease of solar radiation intensity to zero. A reduction in visibility to less than 1 km was observed, as great quantities of ash fell out of the plume onto the ground. Ash loading in the atmosphere remained very high for several days following the eruption, primarily as a result of resuspension from the surface. Visibilities remained low (2 to 8 km) during this period. Estimates of atmospheric turbidity were made from the ratio of diffuse-to-direct solar radiation; these turbidities were used to estimate extinction along a horizontal path, a quantity which can be related to visibility. Comparisons of observed and estimated visibilities were very good, in spite of the rather coarse approximations used in the estimates. Atmospheric clarity and visibility improved to near pre-eruption conditions following a period of rain showers. The diffuse-to-direct ratio of solar radiation provided a useful index for estimating volcanic ash loading of the atmosphere. Author

N83-11555*# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
MOUNT ST. HELENS DUST VEIL OBSERVED AT BOULDER, COLORADO BY OPTICAL TECHNIQUES **c45**
Gordon Lerfald *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 241-250 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

Following the May 18, 1980, eruption of Mount St. Helens, photometric and photograhic observations were taken at Boulder, Colorado, to record the optical effects of volcanic dust atmospherically transported to this area. The instruments used included a narrow-beamwidth solar photometer which recorded solar irradiance in eight narrow-bandwidth channels in the wavelength range 0.3 to 1.1 microns, a solar aureole photometer, and two time-lapse camera systems. The eight-channel solar photometer data have been analyzed to obtain the wavelength dependence of optical thickness. At the longer wavelengths, on May 20, 1980, the optical thickness was as much as nine times that expected from a 'clean atmosphere' model. During the first several days following the eruption, the dust veil sometimes exhibited sufficient spatial structure that its motion can be seen on the time-lapse films. The results of analysis to date are presented and the plans for additional analysis are outlined. Author

N83-11556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRCRAFT SAMPLING OF THE SULFATE LAYER NEAR THE TROPOPAUSE FOLLOWING THE ERUPTION OF MOUNT ST. HELENS **c45**
Erwin A. Lezberg, Dumas A. Otterson, William K. Roberts, and Leonidas C. Papathakos *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 251-259 refs Originally announced as A82-37450 (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

Twenty filter sampling flights of the NASA Lewis F-106 aircraft were conducted in the Great Lakes region between June 4 and August 8, 1980, following the major eruption of Mount St. Helens, Washington on May 18. The IPC-1478 filters were exposed over an altitude range spanning the local tropopause. Quarter sections were analyzed for sulfate and nitrate by ion chromatography and selected samples were analyzed for chloride by selective ion electrode. Trace elements were searched by X-ray fluorescence analysis. A filter sample taken above the tropopause on June 5 indicated a sulfate level of 50 times the baseline measurements. Subsequent measurements over a period of 2 months showed an initial dropoff and formation of a persistent layer of sulfate above the tropopause with a concentration of 10 to 18 times previously measured background-levels. Concentrations of nitrate above the tropopause exhibited considerable variability and some enhancement compared with previously measured concentration levels. It is suggested that the source of the nitrate may also be volcanic as evidenced by its temporal relationship to the sulfate concentration changes. Based on the null results of X-ray fluorescence measurements, there is no evidence of ash particle concentrations greater than 3.4 microns g/cubic m persisting in the layer above the tropopause after the second transit of the cloud. E.A.K.

N83-11557*# Naval Weapons Center, China Lake, Calif. Earth and Planetary Sciences Div.
AN INCURSION OF DUST IN THE SOUTHWESTERN UNITED STATES FROM APRIL 1980 ERUPTIONS OF MOUNT ST. HELENS **c45**
Larry A. Mathews, G. R. Roquemore, P. St.Amand, and J. P. Gibson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 261-267 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

An intrusion of volcanic dust occurred over the northern Mojave Desert, one month before the explosive eruption of 18 May 1980. Visibility was reduced to 15 to 30 miles during meteorological conditions that should have yielded a visibility in excess of 100 miles. This intrusion was documented by particle size distributions, scanning electron microscope analysis of Nuclepore filter samples, insolation measurements, observations by Navy and NASA aircraft, and meteorological data. No further incidents have been observed to date because of a lack of simultaneous volcanic activity with the particular wind patterns that existed in April. Therefore, under certain meteorological conditions, the desert of the southwestern United States could be significantly affected by volcanic ash from an eruption of Mount St. Helens. Author

N83-11558*# Battelle Pacific Northwest Labs., Richland, Wash. Space Sciences Section.
MOUNT ST. HELENS RELATED AEROSOL PROPERTIES FROM SOLAR EXTINCTION MEASUREMENTS **c45**
J. J. Michalsky, E. W. Kleckner, and G. M. Stokes *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 269-273 refs Previously announced as N81-24610 Sponsored in part by DOE (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

A network of solar radiometers, operated on the North American Continent for an average of 2 years before the first major eruption of Mount St. Helens, Washington, continues to collect direct solar data through the eruptive phase of this volcano. The radiometers collect spectral data through 12 interference filters spanning the sensitivity of the photodiode used as detector. The data are collected every 5 minutes in seven filters and every 15 minutes in five additional filters. A variant of the classical Langley method has been used to measure the optical depth of the aerosols as a function of wavelength. The network, which is the nearest station, is located some 180 kilometers east of the volcano, well within range of noticeable effects during much of the minor as well as major activity. The wavelength dependence of the aerosol-optical depth before and after the 22 July 1980 major eruption, which was well characterized because of favorable meteorological conditions is discussed. Author

N83-11559*# California Univ., Livermore. Lawrence Livermore Lab.
DEPOSITION AND DOSE FROM THE 18 MAY 1980 ERUPTION OF MOUNT ST. HELENS c46
Kendall R. Peterson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 275-281 refs (For primary document see N83-11534 02-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A13/MF A01 CSCL 08K

The downwind deposition and radiation doses was calculated for the tropospheric part of the ash cloud from the May 18, 1980 eruption of Mount St. Helens, by using a large cloud diffusion model. The naturally occurring radionnuclides of radium and thorium, whose radon daughters normally seep very slowly from the rocks and soil, were violently released to the atmosphere. The largest dose to an individual from these nuclides is small, but the population dose to those affected by the radioactivity in the ash is about 100 person rem. This population dose from Mount St. Helens is much greater than the annual person rem routinely released by a typical large nuclear power plant. It is estimated that subsequent eruptions of Mount St. Helens have doubled or tripled the person rem calculated from the initial large eruption. The long range global ash deposition of the May 18 eruption is estimated through 1984, by use of a global deposition model. The maximum deposition is nearly 1000 kg square km and occurs in the spring of 1981 over middle latitudes of the Northern Hemisphere. E.A.K.

N83-11560*# Battelle Pacific Northwest Labs., Richland, Wash.
AMBIENT AIRBORNE SOLIDS CONCENTRATIONS INCLUDING VOLCANIC ASH AT HANFORD, WASHINGTON SAMPLING SITES SUBSEQUENT TO THE MOUNT ST. HELENS ERUPTION c45
George A. Sehmel *In* NASA. Langley Research Center Atmoheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 283-291 refs (For primary document see N83-11534 02-42)
(Contract DE-AC06-76RL-01830)
Avail: NTIS HC A13/MF A01 CSCL 13B

Airborne solids concentrations were measured on a near daily basis at two Hanford, Washington sites after the eruption of Mount St. Helens on May 18, 1980. These sites are about 211 km east of Mount St. Helens. Collected airborne solids included resuspended volcanic ash plus normal ambient solids. Average airborne solids concentrations were greater at the Hanford meteorological station sampling site which is 24 km northwest of the Horn Rapids dam sampling site. These increased concentrations reflect the sampling site proximity to greater ash fallout depths. Both sites are in low ash fallout areas although the Hanford meteorological station site is closer to the greater ash fallout areas. Airborne solids concentrations were decreased by rain, but airborne solids concentrations rapidly increased as surfaces dried. Airborne concentrations tended to become nearly the same at both sampling sites only for July 12 and 13. Author

N83-11561*# East Anglia Univ., Norwich (England). Climatic Research Unit.
THE FORMULATION OF LAMB'S DUST VEIL INDEX c45
P. M. Kelly and C. B. Sear *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 293-298 refs (For primary document see N83-11534 02-42)
(Grant N00014-77-G-0074)
Avail: NTIS HC A13/MF A01 CSCL 13B

A catalog of the major explosive volcanic eruptions since 1500 AD and formulated the Dust Veil Index (DVI) is presented. The DVI quantifies the impact on the Earth's energy balance of changes in atmospheric composition due to explosive volcanic eruptions. The DVI for a particular eruption quantifies the climatic impact of the dust and aerosol injection from the eruption integrated over the years following the event. The formulation of the DVI is described. All references are to Lamb (1970). A distinction is made between the catalog of volcanic activity, and the tabulation of the northern hemisphere DVI apportioned over the years. The DVI data are updated to 1975 for any particular eruption, the catalog gives three DVI values: global, Southern Hemisphere, and Northern Hemisphere. The global DVI given in the catalog is considered. The other two DVIs relate to the impact on the hemispheres considered separately and their estimation involves an additional factor apportioning the dust veil between the hemispheres on the basis of the latitude of injection. E.A.K.

N83-11562*# Institut d'Aeronomie Spatiale de Belgique, Brussels.
FORWARD SCATTERING AND BACKSCATTERING OF SOLAR RADIATION BY THE STRATOSPHERIC LIMB AFTER MOUNT ST. HELENS ERUPTION c46
M. Ackerman and C. Lippens *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 299-303 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

Stratospheric limb radiance profiles versus altitude of closest approach of the line of sight to the Earth's surface have been measured before and after the Mount St. Helens eruptions by means of photographs taken from a Sun-oriented balloon gondola floating above 35 km altitude over France. Preliminary data were reported for flights in October 1979 and in May and June 1980. The radiance integrated along the line of sight as in-situ radiance (R) can be derived taking into account absorption by ozone and air. The onion peeling inversion method was used to derive the vertical radiance (R) profiles respectively. The values of R were determined in the solar azimuth. The solar elevation angles are chosen larger for the backscattering observation than for the forward scattering observation to deal with as similar illumination conditions as possible despite the Earth's sphericity. E.A.K.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-11563 Bayerische Akademie der Wissenschaften, Munich (West Germany).
REPORT ON THE SPECIAL PROGRAM 78 SATELLITE GEODESY OF THE TECHNICAL UNIVERSITY OF MUNICH Progress Report, 1980 [DIE ARBEITEN DES SONDERFORSCHUNGSBEREICHES 78 SATELLITENGEODAESIE DER TECHNISCHE UNIVERSITAET NUEMCHEN IM JAHRE 1980]
Manfred Schneider Bayerischen Akademie der Wissenschaften. 1981 216 p refs In GERMAN
(Astron-Geodaet-Arb-41; ISBN-3-7696-9784-7; ISSN-0340-7691) Copyright. Avail: Issuing Activity

Various topics include: (1) direction finding; (2) range finding; (3) Doppler measurements; (4) construction of a receiver for radio interferometry; (5) mobile laser range finding system; (6) figure-and field parameter determination/geopotential; (7) dynamics of the Earth-Moon system; and (8) kinematics of geodetic point fields. Author (ESA)

N83-11564 Bayerische Akademie der Wissenschaften, Munich (West Germany).
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON THE ACCURACY OF CLOSE-RANGE PHOTOGRAMMETRY Ph.D. Thesis - Stuttgart Univ. [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN ZUR GENAUIGKEIT DER NAHBEREICHSPHOTOGRAMMETRIE]
Wolf-Ulrich Boettinger Bayerischen Akademie der Wissenschaften 1981 148 p refs In GERMAN
(Ser-C-266; ISBN-3-7696-9318-3; ISSN-0065-5325) Copyright. Avail: Issuing Activity

Theoretical and experimental investigations were performed in

order to obtain indications, concerning the accuracy in the entire domain of close-range photogrammetry. For all important steps, a theoretical simulation was done and experimentally verified, using well chosen cases. A measuring chamber with high internal stability and equipped with geodetical instruments was constructed. An average point accuracy of + or - 0.05 mm was obtained. The investigation of a conventional calibration and orientation system with regard to its applicability in close-range photogrammetry led to modifications in the system. The orientation accuracy corresponds approximately to that of aerial photography. Adding a third picture for orientation, according to the bundle method, improves the result by 15%. A 50% accuracy improvement occurs in the registration direction for convergence angle of about 30 deg arc and a basis height ratio of 1:1. All theoretical and experimental investigations show that this is the best situation for close-range photogrammetry. Author (ESA)

N83-11565 Bayerische Akademie der Wissenschaften, Munich (West Germany).
INVESTIGATION OF THE GEOMETRICAL STABILITY OF A PHOTOGRAMMETRIC RECORDING SYSTEM Ph.D. Thesis - Bonn Univ. [UNTERSUCHUNG ZUR GEOMETRISCHEN STABILITAET EINES PHOTOGRAMMETRISCHEN AUFNAHMESYSTEMS]
Karl Heiko Ellenbeck Bayerischen Akademie der Wissenschaften 1981 73 p refs In GERMAN
(Ser-C-267; ISBN-3-7696-9319-1; ISSN-0065-5325) Copyright. Avail: Issuing Activity

System parameters and their effect on the error of a photogrammetric recording system were investigated in order to evaluate the stability with respect to system errors and parameters. The possibilities of determination and separation of system errors is also explained. From the comparative investigations of different flights, the importance of a single system parameter for the photogrammetric result was deduced and requirements for the choice of system parameters in photogrammetric systems with high accuracy were deduced. The results show that the stability of the systems parameters and the possibility to register completely the system errors are closely dependent. Author (ESA)

N83-11566*# Colorado Univ., Boulder. Cooperative Inst. for Research in Environmental Sciences.
GRAVITY MEASUREMENTS IN SUPPORT OF LONG-BASELINE GEODESY Final Report, Mar. 1980 - Aug. 1982
James H. Whitcomb [1981] 40 p refs
(Grant NAG5-21)
(NASA-CR-169468; NAS 1.26:169468) Avail: NTIS HC A03/MF A01 CSCL 08E

Gravity data, believed to be relevant to unknown questions of earthquake premonitory crustal processes, are discussed and presented. N.W.

N83-11567# Missouri Univ., Columbia. Dept. of Geology.
USE OF LONGITUDINAL CONDUCTANCE IN ESTIMATING TRANSMISSIVITY OF GRANULAR AQUIFERS IN NORTHERN MISSOURI M.S. Thesis
Cynthia M. Keefe May 1981 163 p refs
(Grants OWRT-A-129-MO(1); OWRT-14-34-0001-0127)
(PB82-03957; W-113546) Avail: NTIS HC A08/MF A01 CSCL 08H

An inverse relationship between longitudinal conductance and transmissivity for granular aquifers was mathematically derived. The relationship was used to develop a technique of hydrogeologic investigation. This technique also involves corrections for variations in groundwater salinity and clayey confining layers. Both modern and preglacial alluvial channels in northern Missouri were investigated by this method. The effects of the channel walls on resistivity are shown. The technique eliminates the need for resolution of the parameters, as long as the aquifer under investigation is granular. GRA

N83-11568# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Numerical Modeling Div.
COLLINEAR-TRACK ALTIMETRY IN THE GULF OF MEXICO FROM SEASAT: MEASUREMENTS, MODELS AND SURFACE TRUTH Final Report
J. Dana Thompson, George H. Born (JPL, California Inst. of Tech., Pasadena), and George A. Maul Jun. 1982 36 p refs
(AD-A118160; NORDA-TN-57) Avail: NTIS HC A03/MF A01 CSCL 18/3

From 17 September to 10 October 1978 SEASAT made collinear passes over the Gulf of Mexico. Altimeter data for eight, three-day repeat passes over the eastern Gulf were examined using an arc-segment fitting technique to determine the mesoscale temporal variability of the sea surface. The pattern of sea height variability was then compared with sea height data generated by a numerical model of the Gulf (Hurlburt and Thompson, 1980) from the simulation of a complete cycle of Loop Current intrusion and shedding of an anticyclonic eddy. The model data was found to match that from the SEASAT altimeter when an anticyclonic eddy separated from the Loop Current and the Loop began to repenetrate into the eastern Gulf. Analysis of sparse ground truth data from ship-of-opportunity XBT's, satellite infrared imagery of the Loop Current boundary, and synthetic aperture radar (SAR) imagery, also from SEASAT, tend to confirm the circulation patterns deduced from the altimeter data and the numerical model. Author (GRA)

N83-11569# Army Engineer Topographic Labs., Fort Belvoir, Va. Geographic Sciences Lab.
TERRAIN ANALYSIS PROCEDURAL GUIDE FOR DRAINAGE AND WATER RESOURCES (ETL SERIES ON GUIDES FOR ARMY TERRAIN ANALYSTS)
Jeffrey A. Messmore Apr. 1982 245 p refs
(DA Proj. 4A7-62707-A-855)
(AD-A118318; ETL-0285; Rept-8) Avail: NTIS HC A11/MF A01 CSCL 08/2

This document is one in a series of terrain analysis procedural guides being developed in support of the Topographic Support System (TSS). It was written specifically for the U.S. Army's Terrain Analysts and presents the methodology for extracting, reducing, and recording information for the drainage and water resources data field. This data field is divided into 3 subfields: (1) watercourses and water bodies, (2) drainage basins, and (3) ground water. Step-by-step procedures are provided for producing a factor overlay and supporting data tables for each of the drainage and water resources data fields. Author (GRA)

N83-11570# Naval Surface Weapons Center, Dahlgren, Va.
MEAN EARTH ELLIPSOID DETERMINED FROM SEASAT ALTIMETER OBSERVATIONS Final Report
Gladys B. West Sep. 1981 21 p refs
(AD-A117910; NSWC/TR-252) Avail: NTIS HC A02/MF A01 CSCL 03/1

The radius and the origin of a mean-Earth ellipsoid have been determined from SEASAT satellite radar altimeter observations of the ocean surface and potential coefficients. Assuming that the altimetric geoid is the best available, adjustments are made to the geoid derived from potential coefficients so that the geoid height differences are minimized. A least-squares fitting procedure based on mean geoid heights in 5 degrees x 5 degrees areas was used in the determination of the ellipsoidal parameters. Solutions from two different sets of altimetric geoid heights and geoid heights derived from potential coefficients gave a mean-Earth ellipsoid with radius, a = 6378134.9 m and origin shifts less than 1 m in the x and y components and approximately -2.5 m in the z component. Author (GRA)

N83-11571# Naval Surface Weapons Center, Dahlgren, Va.
EVALUATION OF GEODETIC PRODUCTS PRODUCED BY THE NSWC REDUCTION OF SEASAT RADAR ALTIMETER DATA Final Report
Samuel L. Smith, III and Thomas I. Hicks Jun. 1981 36 p refs
(AD-A117837; NSWC/TR-81-260) Avail: NTIS HC A03/MF A01 CSCL 08/5

An estimation is made of the possible errors associated with

the processing by NSWC of raw SEASAT altimetry data to produce ocean geodetic data, e.g., geoid heights and vertical deflections. Also the noise level of the SEASAT radar altimetry is estimated. Then the SEASAT geodetic data are examined for self-consistency on repeat-track sequences and compared with other independent geodetic data obtained from ocean gravity surveys by ships. Anomalies in the comparisons are examined to determine probable causes. Author (GRA)

N83-11572# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
RADAR GEOMETRY OF SURFACE VELOCITY MAPS
James A. Leise Feb. 1982 23 p refs
(PB82-200957; NOAA-82040706; NOAA-TM-ERL-WPL-93) Avail: NTIS HC A02/MF A01 CSCL 08B

A single radar measures one degree of freedom, the radial velocity component; the natural geometry is polar-coordinate. Polar data from two radars can, in turn, be combined to resolve two-dimensional Cartesian vectors. The transformation that does this conversion is derived; instabilities are studied; error curves are given; ground-truth experimental design is discussed. A method for extending over instabilities is presented. Author (GRA)

N83-11573# Geological Survey, Austin, Tex. Water Resources Div.
WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1977. VOLUME 3: COLORADO RIVER, LAVACA RIVER, GUADALUPE RIVER, NUECES RIVER, RIO GRANDE BASINS AND INTERVENING COASTAL BASINS Technical Report, 1 Oct. 1976 - 30 Sep. 1977
Aug. 1978 577 p refs Prepared in cooperation with Texas Dept. of Water Resources 3 Vol.
(PB82-202052; USGS/WRD/HD-78-062; USGS/WDR/TX-77-3) Avail: NTIS HC A25/MF A01 CSCL 08H

Surface-water data for the 1977 water year for Texas are presented. Data consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and were published as miscellaneous measurements. Records for a few pertinent stations in bordering state are also included. Author (GRA)

N83-11574# Geological Survey, Bay Saint Louis, Miss. Hydroscience Center.
ONE-DIMENSIONAL RESERVOIR-LAKE TEMPERATURE AND DISSOLVED OXYGEN MODEL
Leo B. House Jan. 1982 122 p refs
(PB82-200726; USGS/WRD/WRI-82-016) Avail: NTIS HC A06/MF A01 CSCL 08H

A one-dimensional computer model that predicts dissolved-oxygen and temperature profiles in a lake or reservoir is documented. Downstream release dissolved-oxygen concentrations and temperaures also are computed based on a user-specified outflow withdrawal elevation. The dissolved-oxygen and temperature profiles are computed for a conceptual vertical water column located at the deepest point in the lake or reservoir. The water column is divided into a series of uniform thickness horizontal layers for computation purposes. The model operates on a daily simulation interval, with summary output given for each day and detailed depth profiles printed on user-specified. Model options allow the simulation of 5-day biochemical oxygen demand, sediment oxygen demand, and the density current effects of inflowing suspended sediment. Author (GRA)

N83-11575# National Weather Service, Cincinnati, Ohio. Scientific Services Div.
PUPPY (AFOS HYDROLOGIC DATA REPORTING PROGRAM)
Daniel P. Provost Dec. 1981 81 p refs Prepared in cooperation with National Weather Service, Garden City, N.Y.
(PB82-199720; NOAA-82032204; NOAA-NWS-ERCP-3) Avail: NTIS HC A05/MF A01 CSCL 08H

PUPPY, a computer program, is designed to automate the handling of hydrologic data in the interim before the Office of Hydrology implements another program. Once the data (precipitation observations, river stages, etc.) is entered via PUPPY, it can be passed to other computer systems without manual intervention. PUPPY also produces hydrologic weather wire products and plotfiles for transformation into graphics. PUPPY runs on the Data General ECLIPSE S/230 and interacts with another data base. The language used is FORTRAN IV. GRA

N83-11576# Illinois State Water Survey, Champaign. Groundwater Section.
PROCEDURES FOR THE COLLECTION OF REPRESENTATIVE WATER QUALITY DATA FROM MONITORING WELLS
James P. Gibb, Rudolph M. Schuller, and Robert A. Griffin 1981 72 p refs
(Contract EPA-R806304-010)
(PB82-194952; ISWS/COOP-7/81) Avail: NTIS HC A04/MF A01 CSCL 08H

Procedures for the collection of representative water samples from monitoring wells were evaluated. The effects on chemical composition of water samples of four types of pumping mechanisms, the extent of well flushing, the rate and time of pumping, and storage and preservation techniques were studied. The selection of the type of sampling device; sample preparation, preservation, and storage; and sampling procedures all must be tailored to the size and accessibility of the individual well, its hydrologic and chemical character, the chemical constituents of interest, and the purpose for monitoring the site. Recommended sampling procedures include: (1) using peristaltic or submersible diaphragm type pumps when possible; (2) conducting pump tests prior to sampling to determine sampling frequency and time and rate of pumping; (3) flushing the well by pumping 4 to 6 well volumes; (4) measuring key parameters at the time of sample collection; and (5) filtering samples immediately on site and then preserving the samples immediately after filtration. GRA

N83-11577# Geological Survey, Lakewood, Colo. Water Resources Div.
WATER RESOURCES DATA FOR COLORADO, WATER YEAR 1980. VOLUME 2. COLORADO RIVER BASIN ABOVE DOLORES RIVER Annual Report, 1 Oct. 1979 - 30 Sep. 1980
Jul. 1981 404 p refs Sponsored in part by State of Colorado 3 Vol.
(PB82-188293; USGS/WRD/HD-81-065; USGS/WRD/CO-80-2) Avail: NTIS HC A18/MF A01 CSCL 08H

Water resources data for Colorado for the 1980 water year consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. Discharge records for about 460 gaging stations, stage and contents of 22 lakes and reservoirs, 4 partial record low flow stations, 30 crest stage partial record stations, and 50 miscellaneous sites are given. Water quality for 163 gaging stations and 300 miscellaneous sites and water levels for 55 observation wells are also given. A few pertinent stations in bordering States also are included. Author (GRA)

N83-11400# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. Fuer Optoelektronik.
IMAGE PROCESSING OF REMOTELY SENSED PHENOMENA
Klaus A. Ulbricht *In* AGARD Image Process. Tech. May 1982 18 p refs Original document contains color illustrations (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11538*# Geological Survey, Arvada, Colo. Water Resources Survey.
IMPACT OF MOUNT ST. HELENS ERUPTION ON HYDROLOGY AND WATER QUALITY

Joe E. Bonelli, H. E. Taylor, and J. M. Klein *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 43-46 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08H

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-11578# National Building Research Inst., Pretoria (South Africa).
THE PREDICTION OF THE THERMAL PERFORMANCE OF BUILDING BY THE CR-METHOD
J. D. Wentzel, R. J. Page-Shipp, and J. A. Venter 1981 26 p
(CSIR-BRR-396; ISBN-0-7988-2047-0) Avail: NTIS HC A03/MF A01

A method for predicting the hottest and coldest likely indoor conditions in a house, given the materials of construction, general design details and layout is described. The procedure is based on an analysis of many measured values and thus requires no experimental verification. Although the calculation procedure, which is fully analyzed and illustrated by means of an example, is fairly complex, it requires no knowledge of advanced mathematics and all calculations can be done on a hand calculator. The procedure is not meant to replace sophisticated building energy and thermal performance prediction computer programs but is aimed at users who do not have computer facilities but nevertheless wish to assess the likely thermal performance of different structures. The product of heat storage capacity (C) and weighted or equivalent resistance to heat flow (R) comprise one prediction method. The procedure assumes reasonable provision of cross-ventilation and also that windows are shaded to prevent direct sun penetration in summer. Author

N83-11579*# Kaman Aerospace Corp., Bloomfield, Conn.
DESIGN AND FABRICATION OF COMPOSITE BLADES FOR THE MOD-1 WIND TURBINE GENERATOR Final Report
William R. Batesole and Clifford T. Gunsallus Nov. 1981 106 p refs
(Contracts DEN3-131; DE-AI01-76ET-2030)
(NASA-CR-167987; DOE/NASA/0131-1; NAS 1.26:167987; RR-1685) Avail: NTIS HC A06/MF A01 CSCL 10B

The design, tooling, fabrication, quality control, and testing phases carried out to date, as well as testing still planned are described. Differences from the 150 foot blade which were introduced for cost and manufacturing improvement purposes are discussed as well as the lightning protection system installed in the blades. Actual costs and manhours expended for Blade No. 2 are provided as a base, along with a projection of costs for the blade in production. A.R.H.

N83-11580*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OAO-3 END OF MISSION POWER SUBSYSTEM EVALUATION
Michael Tasevoli Aug. 1982 38 p refs Presented at the 17th IECEC, Los Angeles, 8-13 Aug. 1982
(NASA-TM-83959; NAS 1.15:83959) Avail: NTIS HC A03/MF A01 CSCL 10C

End of mission tests were performed on the OAO-3 power subsystem in three component areas: solar array, nickel-cadmium batteries and the On-Board Processor (OBP) power boost operation. Solar array evaluation consisted of analyzing array performance characteristics and comparing them to earlier flight data. Measured solar array degradation of 14.1 to 17.7% after 8 1/3 years is in good agreement with theortical radiation damage losses. Battery discharge characteristics were compared to results of laboratory life cycle tests performed on similar cells. Comparison of cell voltage profils reveals close correlation and confirms the validity of real time life cycle simulation. The successful operation of the system in the OBP/power boost regulation mode demonstrates the excellent life, reliability and greater system utilization of power subsystems using maximum power trackers. Author

N83-11581# EIC, Inc., Newton, Mass.
INVESTIGATION OF LITHIUM SULFUR DIOXIDE (LI/SO2) BATTERY SAFETY HAZARDS: CHEMICAL STUDIES Final Report, 24 Dec. 1980 - 23 Dec. 1981
K. M. Abraham, M. W. Rupich, and L. Pitts Apr. 1982 109 p refs
(Contract N60921-81-C-0084)
(AD-A118363; C-656; NSWC/TR-82-148) Avail: NTIS HC A06/MF A01 CSCL 10/3

The chemistry associated with the discharge and forced overdischarge of the Li/SO2 cell was investigated in detail. A procedure for the quantitative determination of Li2S2O4 in discharged Li/SO2 cells is described. The amount of Li2S2O4 found in cells discharged to potentials down to zero volt was in very good agreement with the discharge stoichiometry, 2Li + 2SO2 yields Li2S2O4. The Li2S2O4 formed in the carbon cathode was also characterized by infrared, ESCA, and X-ray analyses. A number of organic compounds including CH4 and 3,5-diamino-2,4-hexenenitrile have been identified in forced overdischarged cells. Products identified in cells which vented during forced overdischarge include: CO2, CS2, COS, H2S, CH4, C2H4, C2H2, Li2S, and Li2SO3. GRA

N83-11582# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INDUCTIVE ENERGY STORES
L. P. Poberezhskiy 9 Jul. 1982 16 p refs Transl. into ENGLISH from Tr. Mosk. Energ. Inst. Elektroenerg. (USSR), no. 45, 1962 p 170-181
(AD-A118337; FTD-ID(RS)T-0877-82) Avail: NTIS HC A02/MF A01 CSCL 09/1

Inductive energy stores research is reviewed. Discharge of the store is considered mathematically. Inductance coils are also discussed. N.W.

N83-11583# Rycon, Inc., Cincinnati, Ohio.
PERFORMANCE ANALYSIS OF COFIRING DENSIFIED REFUSE DERIVED FUEL IN A MILITARY BOILER Final Report, Aug. 1980 - Sep. 1981
Tyndall AFB, Fla. Air Force Engineering and Services Center Dec. 1981 93 p
(Contract MIPR-N-80-50; AF Proj. 2054)
(AD-A118022; AFESC/ESL-TR-81-59) Avail: NTIS HC A05/MF A01 CSCL 21/4

This report provides an overview of existing densified refuse-derived fuel (dRDF) receiving, storage, handling and combustion equipment at Wright-Patterson Air Foce Base. DRDF is being burned as part of a long term alternative fuel evaluation program to develop design and procurement criteria for multiple fuel boilers. Recommendations are offered for specific equipment, procedural changes, and studies to improve the efficacy of the present configurations of dRDF as a fuel. A discussion of the fuel use criteria is presented. The options for continuing the present dRDF supply arrangement vs. the feasibility of local production of dRDF are presented. Research needs are summarized. A preemptive, integrated local synthetic solid fuel production facility and boiler performance test is recommended as a continuation of the program. Author (GRA)

N83-11584# Eltra Corp., Plymouth Meeting, Pa. Batteries Div.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF ADVANCED LEAD-ACID BATTERIES FOR UTILITY LOAD LEVELING Final Summary Report

Mar. 1982 52 p refs
(Contract W-31-109-eng-38)
(DE82-019796; ANL/OEPM-81-15) Avail: NTIS HC A04/MF A01

A cost and design study was conducted on the production of lead-acid batteries. The major conclusions with regard to a mature level of production, 100 0 man-work hours (MWH) per year in 100 MWH installations, are the following: using vertically integrated, automated plants, and a 14 KAH cell design, it is projected that the 100 MWH battery can be manufactured for $76 per kilowatt hour (KWH). The large 10 and 14 kilowatt amphere hour (KAH) cells were found to be more economical than the small 3.4 KAH (6.5 KWH) cell. It is inferred that batteries prepared from large, cell sizes (10 and 14 KAH) will be inherently more reliable due to the reduced number of intercell connections and reduced number of cells requiring maintenance operations, compared to batteries made with small cells (3400 AH). The battery footprint energy density goal can be achieved with tiering of the 14 KAH cell and the specification of somewhat reduced aisle widths on the outside of the strings. Sensitivity studies were performed on the impact of lead price, design cycle life, materials cost reductions, and increase in active materials utilization on the cost of the 100 MWH battery. DOE

N83-11585# Sandia Labs., Albuquerque, N. Mex.
EFFICIENCY-IMPROVEMENT STUDY FOR GaAs SOLAR CELLS Final Report, 31 Mar. 1980 - 30 Sep. 1981
J. A. Cape, J. R. Oliver, and S. W. Zehr Apr. 1982 178 p refs Prepared in cooperation with Rockwell International Corp., Thousand Oaks, Calif.
(Contract DE-AC04-76DP-00789)
(DE82-016410; SAND-82-7105) Avail: NTIS HC A09/MF A01

High yield fabrication of good quality AlGaAs/GaAs concentration solar cells has been a limiting factor in widespread utilization of these high conversion efficiency (22 to 24%) photovoltaic cells. Reported is a series of investigations to correlate solar cell yield with substrate quality, growth techniques, layer composition, and metallization processes. In addition, several diagnostic techniques are described to aid in device characterization. DOE

N83-11586# Pacific Northwest Lab., Richland, Wash.
EVALUATION OF SOLAR-AIR-HEATING CENTRAL-RECEIVER CONCEPTS
S. P. Bird, M. K. Drost, T. A. Williams, D. R. Brown, J. A. Fort, B. A. GarrettPrice, S. G. Hauser, M. A. McLean, A. M. Paluszek, and J. K. Young Jun. 1982 140 p refs
(Contract DE-AC06-76RL-01830)
(DE82-016924; PNL-4003) Avail: NTIS HC A07/MF A01

The potential of seven proposed air-heating central receiver concepts are evaluated based on an independent, uniform of each one's performance and cost. The concepts include: metal tubes, ceramic tubes, sodium heat pipes, ceramic matrix, ceramic domes, small particles, and volumetric heat exchange. The selection of design points considered in the analysis, the method and ground rules used in formulating the conceptual designs are discussed, and each concept design is briefly described. The method, ground rules, and models used in the performance evaluation and cost analysis and the results are presented. DOE

N83-11587# Center Four Engineering, Redmond, Oreg.
BASIN VIEW GEOTHERMAL HEATING DISTRICT, KLAMATH FALLS, OREGON. CONCEPTUAL DESIGN AND ECONOMIC-FEASIBILITY STUDY REPORT
1 Jul. 1981 63 p Prepared for Oregon Inst. of Tech., Klamath Falls
(Contract DE-FG06-79ET-27256)
(DE82-015108; DOE/ET-27256/T20) Avail: NTIS HC A04/MF A01

The findings of a feasibility study performed for Basin View Heating District in Klamath Falls, Oregon are reported. The physical, economic, and political feasibility of establishing a geothermal heating district to provide space heat to housing units in the Basin View Development of Klamath Falls are determined. Of the several systems considered, all are physically feasible. The project is politically feasible if the owner complies with governmental requirements. Economic feasibility is based on considerations of money value rates, tax rates and expected rates of return, which are dependent on government and money markets. For analysis a money value rate of 21% and an owner's marginal tax rate of 35% were adopted. DOE

N83-11588# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 10. NEWMAN POWER STATION, EL PASO, TEX.
Apr. 1982 23 p
(Contract DE-AC04-76DP-00789)
(DE82-015791; SAND-81-7086/10) Avail: NTIS HC A02/MF A01

Performance data are presented for a photovoltaic power supply at a Texas utility for the month of March, 1982. Data given include: daily and monthly electrical energy produced; daily and monthly solar energy incident in the array plane; daily and monthly efficiency; energy production as a function of power level, voltage, cell temperature, and hour of the day; daily and monthly photovoltaic power to the load and the corresponding dollar value; capacity factor; daily availability; daily and hourly insolation; daily and hourly ambient temperature; daily and hourly wind speed; wind direction distribution; hourly cell temperature; heating and cooling degree days; number of freeze and thaw cycles; and data acquisition mode and recording interval plot. Also included is an operations and maintenance report summarizing two events. DOE

N83-11589# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 10. LOVINGTON SQUARE SHOPPING CENTER, LOVINGTON, N. MEX. (USA)
Apr. 1982 29 p
(Contract DE-AC04-76DP-00789)
(DE82-015792; SAND-81-7085/10) Avail: NTIS HC A03/MF A01

Performance data are presented for a photovoltaic power supply at a New Mexico shopping center for the month of March, 1982. Data given include: daily and monthly electrical energy produced; daily and monthly solar energy incident in the array plane; daily and monthly efficiency; energy produced as a function of power level, voltage, cell temperature, and hour of the day; power conditioner input, output, and efficiency for two units and for the overall power conditioning system; daily and monthly photovoltaic energy supplied to the load and the corresponding dollar value; system efficiency; capacity factor; daily availability; daily and hourly insolation, ambient temperature, and wind speed; hourly cell temperature; wind direction distribution; heating and cooling degree days; number of freeze and thaw cycles; and the data acquisition mode and recording interval plot. Also included is a report of operation and maintenance for the month. DOE

N83-11590# Maschinenfabrik Augsburg-Nuernberg A.G., Augsburg (West Germany). Neue Technologie.
TEST PROGRAM FOR WIND ENERGY CONVERSION SYSTEM GROWIAN Final Report, Sep. 1981
Friedrich Koerber Bonn Bundesministerium fuer Forschung und Technologie Jun. 1982 132 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-072; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27,50

The planned test program for wind energy conversion is described. Measurements made of wind distribution, efficiency of energy conversion, dynamic effects, electric behavior, optimization of control, and environmental impact, like sound and TV interferences are discussed. Wind distribution is measured far enough in front of the windmill, just before the blades, and behind the rotor by a grid arrangement of anemometers covering entirely the rotor

area in 25m steps. Measuring programs carried out on other windmills, location of measurement instruments, protection against lightning, and computation of data are reviewed. A proposal for measurement procedures and data processing is made.
Author (ESA)

N83-11591# Forschungsstelle fuer Energiewirtschaft, Munich (West Germany).
STUDY OF THE POSSIBILITIES OF MORE RATIONAL USE OF ENERGY IN THE SECTOR OF TRADE AND COMMERCE, PART 2 Final Report, Aug. 1981
Karl Friedrich Ebersbach, Alfred Fischer, Guenther Layer, Walter Steinberger, Manfred Wegner, and Bernhard Wiesner Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 175 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-077-Pt-2; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34

The energy demand in the sector of trade and commerce was registered and analyzed. Measures to improve the energy demand structure are presented. In several typical firms like hotels, office buildings, locksmith's shops, motor vehicle repair shops, butcher's shops, laundries and bakeries, detailed surveys of energy consumption were done and included in a statistic evaluation. Subjects analyzed were: development of the energy supply; technology of energy application; final energy demand broken down into demand for light, power, space heating and process heat as well as the demand for cooling; daily and annual load curves of energy consumption and their dependence on various parameters; and measures to improve the structure of energy demand. Detailed measurement points out negligences in the surveyed firms and shows possibilities for likely energy savings. In addition, standard values for specific energy consumption are obtained. Author (ESA)

N83-11592# Broetje (August) G.m.b.H. und Co., Rastede (West Germany).
DIESEL DRIVEN LOW CAPACITY HEAT PUMP FOR HEATING AND HOT WATER PRODUCTION Final Report, Jun. 1981
Peter Hoefler Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 96 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-128; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20

Heat pumps that reduce primary energy consumption for heating needs when they are driven by an internal combustion motor were studied. The heat produced as well from the heat pump as from the combustion in the diesel motor was used for home heating and hot water preparation. The objective was a 25kW capacity for a one familiy house. Material used should be standard, so a special design diesel motor or heat pump was not considered. An air/water cooled type diesel motor was coupled to a 12kW capacity heat pump for an outdoor temperature of 3 C using R12 freon as refrigerant. Description of all elements is given. Tests were in the laboratory and in a one family house. The expected efficiency factor of 1.34 could not be confirmed and an average annual value of only 1.05 is assumed. The diesel driven heat pump can not produce the energy savings hoped for.
Author (ESA)

N83-11593# Arbeitsgemeinschaft Ruckelshau K.G. (West Germany).
ABSORPTION TYPE WATER CHILLER FIRED DIRECTLY BY WASTE HEAT Final Report, Nov. 1981
Karl-Ludwig Sauer and Klaus Kalwar Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 89 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-129; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The direct use of waste heat as heating element in a water chiller of the absorption type was studied. The chilled water is used as cooling element in the industrial process, producing the waste heat or for conditioning the workplace or further located places. The heat source is gaseous or liquid. The cooling capacity is in the range from 10 to 120 kW. After reviewing the different absorption systems, LiBr/H20 proved to be the most suitable. The process retained for experimenting was the manufacturing of synthetic materials polymer industry and was tested in two different factories. It is proved that the use of absorption type water chillers is practicable with an efficiency of 10% to 25% of the waste heat energy, but that the existing chillers need extensive conversion for obtaining economical operation when using a low temperature heating source. Author (ESA)

N83-11594# Fraunhofer-Inst. fuer Bauphysik, Holtzkirchen (West Germany).
ECONOMICAL OPTIMIZED THERMAL INSULATION IN BUILDINGS Final Report, May 1981
Hans Werner Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 232 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-131; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40

A survey of thermal insulation of buildings, related to economical and physical parameters of fuel oil and insulation methods, was conducted. The different parameters influencing energy consumption in buildings, e.g., heat flux, heat losses by ventilation, internal heat sources, and effect of Sun radiation, were analyzed. A method for determining energy needs was elaborated. The economical and cost depending factors were reviewed and a method of optimizing cost, interest rates, and writing off rate was established. It is stated that energy conservation and economics of building have to be forseen in the planning phase of construction, that the heat losses by ventilation are a main factor, and that Sun radiation can have a very good influence. Also, the uncertain life of some construction elements makes it difficult to optimize the economic choice. A table reviews the main physical parameters which have a primary importance and the relation to cost of materials and fuel price. Author (ESA)

N83-11595# Imhausen-Chemie G.m.b.H., Lahr (West Germany).
THE JOINT AUSTRALIA/FEDERAL REPUBLIC OF GERMANY FEASIBILITY STUDY ON THE CONVERSION OF AUSTRALIAN COALS INTO LIQUID FUELS IN AUSTRALIA Final Report, Aug. 1981
Karl-Heinz Imhausen Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 111 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-133; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23

The IG hydrogenation process used commercially in Germany up to 1945, was improved. Pilot plants in Germany are presently under construction or in the start-up phase. A technical concept for the conversion of Australian bituminous coals and/or Australian brown coals into automotive fuels, using coal hydrogenation, gasification and Fisher-Tropsch synthesis was developed. Development of technology, consumption figures and of expenditure/investment for a complete plant, producing about 3 million tons of automotive fuels per year, was also attempted. The results show that standard automotive fuels are produced from bituminous coal, using a combination of high pressure coal hydrogenation and of Fisher-Tropsch synthesis, and from brown coal, using high pressure coal hydrogenation only. Under the assumption that crude oil prices increase 3% more rapidly than yearly inflation, and the raw material cost are staying at a low level, commercial plants are planned.
Author (ESA)

N83-11596# Stadtwerke Duisberg A.G. (West Germany).
STEAM GENERATOR WITH CIRCULATING ATMOSPHERIC FLUIDIZED BED COMBUSTION Final Report, Apr. 1981
Werner Wein, Hans Hoeffgen, Karl-Heinz Maintok (Deutsch Babcock Anlagen AG), and Georg Daradimos (Lurgi Chemie und Huettentechnik GmbH) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 58 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-134; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

The combustion of coal in power plants by conventional combustion techniques is studied with emphasis on combustion in a circulating atmospheric fluidized bed (CFBC). The CFBC method stays half way between the classical fluidized bed with a well defined bed height and the pneumatic transport where particles and fluidizing gas have the same velocity. The main advantages of CFBC are: flexibility with respect to coal types; easy elimination of 80% of sulfur by mixing the coal with calcium carbonate to a molecular ratio Ca/S of about two; reduced nitrogen oxides production due to the low combustion temperature of 900 C; high steam production efficiency with the combustion degree exceeding 99%; high overall efficiency with no further desulfurizing being needed; easy regulation; high heat transmission rates (350 to 400 W/m2K) reducing exchange surfaces; small boiler building; and the possibility to build in one module a 300 MW unit.
Author (ESA)

N83-11597# Dortmunder Stadtwerke A.G. (West Germany).
UTILIZATION OF THE WASTE HEAT OF A STEEL WORK Final Report, Jan. 1981
Ulrich Kaier (KA-Planungsgesellschaft mbH) and Willy Breymayer (KA-Planungsgesellschaft mbH) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 159 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-135; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,50

The use of waste heat of a Siemens-Martin furnace for the production of high pressure steam for a brewery and for a domestic heating network was evaluated. A review of the different possible uses of the high pressure steam, e.g., for heating, for electricity generating, or for cooling, and the actual cost of electricity and fuel and of the domestic heating cost of the already existing network, was made. Cost of the production of steam is calculated, and due to the possible breakdown or maintenance stopping of the Siemens-Martin furnace, cost of the equipment of the boiler with oil or gas burners was evaluated. It is proved that the economical justification for the use of this waste heat doesn't exist.
Author (ESA)

N83-11598# Kernforschungsanlage, Juelich (West Germany).
PROTOTYPE SOLAR HOUSE. STUDY OF THE SCIENTIFIC EVALUATION AND FEASIBILITY OF A RESEARCH AND DEVELOPMENT PROJECT Final Report, Apr. 1981
Vinzenz Bundschuh, Josef Winfried Grueter, Manfred Kleemann, Michael Melis, Hans Joachim Stein, Hermann Josef Wagner, Adolf Dittrich (Gesellschaft zur Foerderung der Heizungs- und Klimatechnik mbH), and Detlev Pohlmann (Gesellschaft zur Foederung der Heizungs- und Klimatechnik mbH) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 74 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-137; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,50

A preliminary study was undertaken before a large scale project for construction and survey of about a hundred solar houses was launched. The notion of solar house was defined and the use of solar energy (hot water preparation, heating of rooms, heating of swimming pool, or a combination of these possibilities) were examined. A coherent measuring program was set up. Advantages and inconveniences of the large scale project were reviewed. Production of hot water, evaluation of different concepts and different fabrications of solar systems, coverage of the different systems, conservation of energy, failure frequency and failures statistics, durability of the installation, investment maintenance and energy costs were retained as study parameters. Different solar hot water production systems and the heat counter used for measurements are described.
Author (ESA)

N83-11599# Brown, Boveri und Cie, A.G., Heidelberg (West Germany). Zentralesforschungslabor/energiespeicherung.
DEVELOPMENT OF THE SODIUM/SULFUR BATTERIES, PHASE 2 Final Report, Feb. 1981
Beate Adamowicz, Roland Bauer, Wolfgang Doerrscheidt, Hilmar Esrom, Wilfried Fischer, Wilhelm Haar, Friedrich Harbach, Bernd Hartmann, Dieter Hasenauer, Uwe Humrich et al Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 203 p refs In GERMAN; ENSLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-142; ISSN-0340-7608) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36,50

In continuation of Na/S battery development major subjects were studied: optimization of cell performance; battery measurements, first practical battery test; and development of vacuum powder insulation. The energy density of standard cells was increased to 150 kWh/kg, at a discharging time of two hours, the maximum power density 120 W/kg. The average duration of life was increased to 1350 charge/discharge cycles; 7 kWh batteries containing 112 individual cells revealed characteristics which were expected from single cell measurements. Two of these batteries were successfully tested in a van. The heat losses of vacuum powder insulation amount to 70 W/m2; they are lower than the losses from a conventional heat insulation of 80 mm thickness.
Author (ESA)

N83-11600# Eschweiler Bergwerks-Verein A.G., Herzogenrath-Kohlscheid (West Germany).
UTILIZATION OF ANCIT PLANT BY-PRODUCTS Final Report, Feb. 1982
Franz Beckmann Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 88 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-144; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,50

In the ANCIT process, briquets are produced composed of 70% low volatile coal, coke, and/or petroleum coke mixed with 30% caking coal as a binder heated at 500 C and hot pressed. A further development was to transform into economically usable products the by-products resulting from this process. The already existing production plant was modified to: collect and transform into usable form the dust and the condensable products contained in the hot gases evolving from the process; use the latent heat of these gases for drying a part of the primary coal used; tend to an autartic process; and reduce pollution from air and water. A plant, to be planned, is able to utilize the ANCIT by-products economically.
Author (ESA)

N83-11601# AEG-Telefunken, (West Germany). Inst. of Physical Chemistry.
CRUDE GAS/AIR FUEL CELLS WITH A PHOSPHORIC ACID MATRIX Final Report, Apr. 1981
Robert Fleischmann Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 48 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-167; DK-621.352.6.035.2; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,10

Further development of the phosphoric acid matrix cell with

tungsten carbide anodes was undertaken in order to increase the reliability of materials and production process, increase capacity, and reduce maintenance. This led to the long duration testing of single elements, the setting up of five cell elements, and multiple cell elements. Matrix development, fabrication of the active anode layers, fabrication of the cathode layers, fabrication of graphite plates, assembly, and functioning of the cells were investigated. More than one hundred cell assemblies were built and tested between 1000 and 5000 hours of functioning. The multiple cell batteries prove to fail due to local overheating, uneven gas distribution, cracks in graphite plates, and obstruction of the hydrogen gas supply channels. The production technology of the matrix plates was optimized. The specific problem of the larger stacks is evaluated. Author (ESA)

N83-11602# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
EXPERIMENTAL INVESTIGATION OF THE HELMHOLTZ RESONATOR BURNER: THREE MONTHS AT CHINA LAKE, CALIFORNIA
H. F. R. Schoeyer Mar. 1982 19 p refs Sponsored by NATO and Netherlands Organization for the Advancement of Pure Research (ZWO)
(VTH-LR-347) Avail: NTIS HC A02/MF A01

The Naval Weapons Center, its aerothermochemistry division, and the propulsion research laboratory are described. Experiments that were carried out with Helmholtz resonator burners are recounted. Results show that Helmholtz resonator burners can be used to determine the response function of solid rocket propellants. Evidence was also obtained of high sensitivity for oscillatory combustion at low frequencies. Author (ESA)

N83-11603# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AERODYNAMIC RESEARCH ON TIPVANE WIND TURBINES
G. J. W. vanBrussel, T. vanHolten, and G. A. M. vanKuik Apr. 1982 16 p refs
(VTH-LR-355) Avail: NTIS HC A02/MF A01

Aerodynamic loads on small auxiliary wings that are mounted at the tips of wind turbine blades in such a way that a diffuser effect is generated, resulting in a mass flow augmentation through the turbine disk, were analyzed. For load prediction, an expansion method, or lifting line approach, was used. The complete analytical expression for the pressure field consists of two series of basic pressure fields. One series is related to the basic load distributions over the turbine blade, and the other series to the basic load distribution over the tipvane. In addition, another basic pressure field, related to a triangular load distribution over the turbine blade and the tipvane, is needed in order to take care of the lift transfer from turbine blade to tipvane. The coefficients in these pressure field expressions are a priori unknown and are determined by a boundary condition, requiring the flow to be tangential on both turbine blade and tipvane. A numerical procedure then yields the coefficients of the basic pressure fields. Author (ESA)

N83-11604# Midland-Ross Corp., Toledo, Ohio. Thermal Systems Technical Center.
ADVANCED REGENERATIVE HEAT RECOVERY SYSTEM Annual Report, 1981
A. Prasad and J. K. Jasti 18 Feb. 1982 79 p refs
(GRI-5080-342-0394)
(PB82-200650; GRI-80/0115; Rept-1253) Avail: NTIS HC A05/MF A01 CSCL 13B

A regenerative heat recovery system was designed and fabricated to deliver 1500 scfm preheated air to a maximum temperature of 1600 F. Since this system is operating at 2000 F, the internal parts were designed to be fabricated with ceramic materials. This system is also designed to be adaptable to an internal metallic structure to operate in the range of 1100 to 1500 F. A test facility was designed and fabricated to test this system. The test facility is equipped to impose a pressure differential of up to 27 inches of water column in between preheated air and flue gas lines for checking possible leakage through the seals. The preliminary tests conducted on the advanced regenerative heat recovery system indicate the thermal effectiveness in the range of 60% to 70%. Bench scale studies were conducted on various ceramic and gasket materials to identify the proper material to be used in high temperature applications. A market survey was conducted to identify the application areas for this heat recovery system. A cost/benefit analysis showed a payback period of less than one and a half years. Author (GRA)

N83-11605# Swedish Council for Building Research, Stockholm.
DURABILITY OF SOLAR COLLECTORS: EXPERIENCE FROM SURVEYS OF SWEDISH SOLAR COLLECTOR INSTALLATIONS, 1979 - 1980
Olof Lagerkvist and Hans Wennerholm 1982 64 p refs
(PB82-188095; D1:1982; ISBN-91-540-3609-7) Avail: NTIS HC A04/MF A01 CSCL 13A

Solar heating installations were surveyed during the autumn of 1979 and spring of 1980, with a view to identifying damage occurring to solar collectors and problems related to their design and materials, and of attempting to ascertain the reasons therefore. The installations which were investigated were in operation for periods ranging from about a month to up to about five years. GRA

N83-11606# California State Lands Commission, Sacramento.
GEOTHERMAL RESOURCE DEVELOPMENT FOR DIRECT HEAT APPLICATIONS: THE IMPACT OF REGULATION Final Report
Mar. 1981 84 p refs
(PB82-208414; CAEC-88; P500-81-015) Avail: NTIS HC A05/MF A01 CSCL 08I

The laws of 17 western states are reviewed. Interviews were conducted in four states with regulators, drillers, and users to determine the economic impact of regulation on development and utilization of geothermal energy for direct heat applications. Four recommendations are made to encourage greater direct heat applications while maintaining reasonable regulation of the drilling and utilization of the resource. Author

N83-11607# Energy Research Corp., Danbury, Conn.
INTERNAL REFORMING FOR NATURAL GAS FUELED MOLTEN CARBONATE FUEL CELLS Final Report, 1 May 1980 - 30 Jun. 1981
B. Baker, D. Burns, C. Lee, H. Maru, and P. Patel Dec. 1981 107 p Presented at the Natl. Fuel Cell Seminar, Norfolk, Va., Jun. 1981 and at the Intern. Gas Res. Conf., Los Angeles, Sep.-Oct. 1981 Sponsored by Gas Research Inst.
(PB82-200676; ERC-90-6194(13); GRI-80/0126) Avail: NTIS HC A06/MF A01 CSCL 10B

A natural gas fueled molten carbonate fuel cell (MCFC), a system which yields maximum efficiency while operating on internal reforming mode is discussed. Direct internal reforming appears to be a most promising configuration for internal reforming. Compared to the conventional baseline external reformer system, it can save as much as 20% natural gas at reduced capital and operating costs. Bench scale cells were operated with direct methane feed up to 2000 hours. It is shown that a successful development of the internal reforming MCFC will result in significant savings of natural gas and a cost effective electricity generation. GRA

N83-11608# National Bureau of Standards, Washington, D.C. Center for Building Technology.
SOLAR AVAILABILITY IN CITIES AND TOWNS: A COMPUTER MODEL Final Report
Kalev Ruberg Mar. 1982 237 p refs
(Contract DE-AI01-76PR-06010)
(PB82-202201; NBSIR-82-2498) Avail: NTIS HC A11/MF A01 CSCL 10A

An interactive computer program, SOLITE, which was written to determine the incident solar radiation on urban building surfaces, street surfaces and rooms facing urban street canyons is discussed. Hourly weather data and surface descriptors are interactively entered by the user. Solar radiation data are calculated with NOAA weather tape (TMY or TRY) cloud data using the Kimura/

Stephenson cloud cover algorithm. The SOLITE also calculates solar radiation transmission through user specified glazing assemblies. Shadows cast by surrounding buildings and overhangs and interreflection effects in street canyons are captured. Internal heat gains from occupants and lighting, and daylight availability on the workplane of a room are calculated. Output options include weather data summaries, incident insolation, occupant heat gain in rooms and useable hours of daylight in a room with a given occupancy. Either hourly or daily values may be specified as output. GRA

N83-11609# Science Applications, Inc., La Jolla, Calif.
COGENERATION ENERGY SYSTEMS ASSESSSMENT. VOLUME 2: TECHNICAL DISCUSSION Final Report, Apr. 1981 - Jan. 1982
Mar. 1982 252 p refs
(GRI-5081-344-0430)
(PB82-200692; GRI-81/0013.1; SAI-444-82-074-LJ) Avail: NTIS HC A12/MF A01 CSCL 10B

Gas-fueled cogeneration was assessed to identify research and development opportunities and priorities that maximize the benefits of cogeneration to the gas consumer and utilities. The commercial and multi-family residential market sectors ranging in size from 100 kilowatts (kW) to 10 megawatts (MW) were emphasized. Cogeneration that produced mechanical (shaft horsepower) energy as the primary power was excluded. Technical, economic, and market potential for cogeneration systems in the commercial sector was found to exist. The specific results, conclusions, and impacts cited in this report led to the recommendation to pursue three areas of R&D (in order of priority): (1) Prepackaged, pre-engineered systems; (2) Analyses of--the over-100 kW market and technology, the potential for cogeneration at specific sites in specific utility service territories, cogeneration system reliability, characterization of the light industrial market; (3) Technology development (several specific areas).
Author (GRA)

N83-11610# Swedish Council for Building Research, Stockholm.
THERMOCHEMICAL HEAT STORAGE: STATE-OF-THE-ART REPORT
Gerhard Oelert, Heiz Behret, Wendelin Friedel, Brigitt Hennemann, and David Hodgett 1982 164 p refs
(PB82-188087; ISBN-91-540-3653-4) Avail: NTIS HC A08/MF A01 CSCL 10C

A thermochemical heat storage (TCHS) survey and assessment study is reported. Emphasis is given to energy use in buildings, but aspects of the industrial application of thermochemical heat storage are included. Systems of the type heat-in yields thermochemical reaction, yields heat-out are considered. Hydrogen technology, electrochemical, and photochemical methods are excluded. Various applications are considered, covering the most important sectors of energy consumption in Sweden. In this context, discontinuous sorption heat pumps, chemical heat storage, chemical heat pipes, and continuous sorption heat pumps are studied. Author (GRA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-11611# Committee on Merchant Marine and Fisheries (U.S. House).
ACID RAIN: CZMA
Washington GPO 1982 278 p refs Hearings on H.R. 4597 before the Subcomm. on Oceanog. of the Comm. on Merchant Marine and Fisheries, 97th Congr., 1st Sess., 19 Jun., 16 Sep., 29 Oct., and 19 Nov. 1981
(GPO-91-371) Avail: Subcommittee on Oceanography

The effects of acid rain on the environment are discussed. Regulations for its control are debated. The regulation of oil exploration on the continental shelves is discussed. R.J.F.

N83-11612# National Programme for Environmental Sciences, Pretoria (South Africa). Committee for Marine Pollution.
SOUTH AFRICAN MARINE POLLUTION MONITORING PROGRAMME, 1979 - 1982
C. E. Cloete and R. J. Watling Jul. 1981 58 p refs
(SANSPR-51; ISBN-0-7988-2139-6) Avail: NTIS HC A04/MF A01

A national marine pollution survey initiated in 1974 to determine and assess the levels and effects of pollutant discharges to the marine environment of South Africa is described. During the period from 1974 to 1979, impact area surveys, coastal and estuarine reference surveys, as well as oceanic reference surveys were undertaken. From these, sites of major pollution concern were identified. A national marine pollution monitoring programme was then established to monitor these areas more closely for a period of three years (1979 to 1982). The sites studied in the programme, together with the frequency of sampling and the parameters measured are discussed. R.J.F.

N83-11613# National Inst. for Water Research, Pretoria (South Africa).
BIODEGRADABILITY TESTING OF INDUSTRIAL WASTES AND INTRACTABLE SUBSTANCES
R. J. L. C. Drews Aug. 1981 32 p refs
(CSIR-K-57; ISSN-0-7988-2104-3) Avail: NTIS HC A03/MF A01

A short resume of the different methods employed for biodegradability tests is discussed in order to highlight the problems and difficulties which researchers experienced with the methods they chose to employ. Some selected methods as employed and adapted in the National Institute for Water Research are then described. R.J.F.

N83-11614# California Univ., Riverside. Statewide Air Pollution Research Center.
ATMOSPHERIC REACTION MECHANISMS OF AMINE FUELS Final Report, 1 Jan. - 31 Dec. 1981
Ernesto C. Tuazon, William P. L. Carter, Richard V. Brown, Roger Atkinson, Arthur M. Winer, and James N. Pitts, Jr. Tyndall AFB, Fla. AFESC Mar. 1982 222 p refs
(Contract F08635-81-C-0041)
(AD-A118267; AFESC/ESL-TR-82-17) Avail: NTIS HC A10/MF A01 CSCL 13/2

This report describes a detailed investigation of the atmospheric reactions of hydrazine (N2H4), monomethylhydrazine (MMH), and unsymmetrically dimethylhydrazine (UDMH) relevant to assessments of the impact of their releases to the atmosphere as a result of their wide use as fuels for military purposes. Experiments were conducted in 3800 l and 6400 l Teflon reaction chambers, with reactant and product concentrations measured by long pathlength (68.3-102.4 m) Fourier transform infrared (FT-IR) spectroscopy. GRA

N83-11615# Tetra Tech, Inc., Bellevue, Wash.
ENVIRONMENTAL ASPECTS OF ARTIFICIAL AERATION AND OXYGENATION OF RESERVOIRS: A REVIEW OF THEORY, TECHNIQUES, AND EXPERIENCES Final Report, Jan. 1972 - Dec. 1980
Robert A. Pastorok, Marc W. Lorenzen, and Thomas C. Ginn May 1982 280 p refs
(Contract DACW39-80-C-0080)
(AD-A117528; WES-TR-E-82-3) Avail: NTIS HC A13/MF A01 CSCL 13/2

Artificial circulation and hypolimnetic aeration have been used successfully in management of eutrophic reservoirs to alleviate water quality problems, control algal blooms, and improve fish habitat. this report includes: (1) a comprehensive review of aeration/circulation techniques and past experiences encompassing literature from January, 1972, through December, 1980; (2) statistical analyses of artificial circulation experiences to examine the causes of alternative responses to treatment; (3) a

summary of morphometric and water quality data for 107 reservoirs by the U.S. Army Corps of Engineers; and (4) a generic evaluation procedure for alternative management applications in reservoirs. GRA

N83-11616# Oak Ridge National Lab., Tenn. Chemical Technology Div.

MODELING OF AN ANFLOW MUNICIPAL WASTE-TREATMENT UNIT

Daniel J. Halbert and Rosemary J. Wojtowicz Jun. 1982 69 p refs Prepared in cooperation with MIT

(Contract W-7405-eng-26)

(DE82-016617; ORNL/MIT-342) Avail: NTIS HC A04/MF A01

A computer simulation program was written to model ANFLOW, an anaerobic, upflow, packed bed bioreactor. The dynamic model predicts sludge accumulation rates, effluent liquid composition, and effluent gas flow rate and composition as a function of time following a change in inlet flow rate or composition. The ANFLOW reactor was modeled as a settling tank and a series of continuous stirred tank reactors. The reaction scheme and kinetic expressions for anaerobic digestion, adopted from the literature, were based on Monod kinetics for acetogenesis and inhibition kinetics for methanogenesis. Detailed descriptions of the simulation program, its use, and suggestions for its improvement are included. DOE

N83-11617# Bergbau-Forschung G.m.b.H., Essen (West Germany). Abt. Physikalische Chemie.

LABORATORY RESEARCH FOR DESULFURIZING AND NO-REDUCTION BY ADDITION OF AMMONIA UNDER THE CONDITIONS OF THE BERGBAU-FORSCHUNG FLUE GAS DESULFURIZING PROCESS Final Report, Dec. 1980

Ekkehard Richter, Hans-Juergen Schmidt, and Juergen Jung Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 83 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-82-147; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

Laboratory tests were conducted for improving the catalytic efficiency of charcoal and for improving the thermal regeneration of the activated carbon. The injection of ammonia enhances SO2 removal. At high SO2 concentrations, the reduction of NO components is limited. The reduction yield is increased at higher temperatures or in a two stage moving bed reactor, using active coal. In the first bed, mainly sulfur oxides are removed. Upstream from the second bed NH3 is injected. In this way over 99% of SO2 and over 80% of NO components can be removed. This was obtained at temperatures ranging from 120 to 150 C. In this process, SO2 and NO components can be removed both without a modification of the boiler plant and without reheating of the flue gases. Impregnation of the active coal with metal compounds did not increase the catalytic activity. The mechanisms of the reactions, occuring during thermal regeneration of the active charcoal, were found. Author (ESA)

N83-11618# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.

NOISE ANNOYANCE AT 502 REPAIR SHOP IN ALPHEN DE RIJN, NETHERLANDS

A. M. Mimpen and T. Houtgast Jun. 1982 8 p In DUTCH; ENGLISH summary

(Contract A81/KL/070)

(IZF-1982-15; TDCK-76637) Avail: NTIS HC A02/MF A01

On account of complaints regarding noise annoyance, sound measurements were carried out in work rooms and in the canteen of the 502 Herstelwerkplaats. The measuring results show that both the sound level and the recommended reverberation time in the various rooms and in the canteen are exceeded. Recommendations are given to diminish the reverberation time and so the sound level by means of placing sound absorbing materials on the ceiling and in some cases also on the walls. Author (ESA)

N83-11619# Environmental Protection Agency, Research Triangle Park, N.C. Chemistry and Life Sciences Group.

DIRECT MEASUREMENT OF VOLATILE ORGANIC COMPOUNDS IN BREATHING-ZONE AIR, DRINKING WATER, BREATH, BLOOD, AND URINE

Ruth Zweidinger, Mitch Erickson, S. Cooper, Don Whittaker, Edo Pellizzari, and Lance Wallace 1982 104 p refs

(PB82-186545; EPA-600/4-82-015) Avail: NTIS HC A06/MF A01 CSCL 06F

Methods for determining individual human exposure to volatile organic compounds (VOC) encountered during normal daily activities were field-tested on university student volunteers in two geographical areas. Equipment and analytical protocols tested include: a personal air quality monitor employing the synthetic adsorbent Tenax-GC to collect organic vapors for later analysis by gas chromatography/mass spectrometry (GC/MS), a specially designed spirometer for collecting samples of expired human breath on duplicate Tenax-GC cartridges for later GC/MS analysis, and a purge and trap analytical protocol for determining VOC levels in blood and urine. The personal monitor and spirometer proved feasible for collecting abundant quantitative data on most of the 15 target organic vapors. GRA

N83-11620# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.

RECEPTOR MODEL TECHNICAL SERIES. VOLUME 2: CHEMICAL MASS BALANCE Final Report

John E. Core Jul. 1981 132 p refs

(PB82-187345; EPA-450/4-81-016B) Avail: NTIS HC A07/MF A01 CSCL 13B

Using receptor models to identify particulate source impacts is described. The Chemical Mass Balance technique, model theory, and input requirements are discussed. Case studies of applications in control strategies development are presented. Program design, ambient and source testing considerations, the use of receptor models in validating dispersion models and other potential application are discussed. Author (GRA)

N83-11621# Research Triangle Inst., Research Triangle Park, N.C.

LABORATORY EVALUATION OF NON-METHANE ORGANIC CARBON DETERMINATION IN AMBIENT AIR BY CRFYOGENIC PRECONCENTRATION AND FLARE IONIZATION DETECTION Final Report

R. K. M. Jayanty, A. Blackard, F. F. McElroy (EPA, Research Triangle Park, N.C.), and W. A. McClenny (EPA, Research Triangle Park, N.C.) Mar. 1982 89 p refs

(Grant EPA-68-02-3431)

(PB82-224965; EPA-600/4-82-019) Avail: NTIS HC A05/MF A01 CSCL 07D

The feasibility of a technique for analyzing samples of ambient air for gaseous nonmethane organic compounds (NMOC) using a cryogenic trap to both preconcentrate and separate NMOC from methane (CH4) is demonstrated. The NMOC is subsequently measured by warming the trap to release the NMOC and channeling the concentrated sample of NMOC into a modified commercial flame ionization detector. The system response per carbon atom is linear and uniform for a large group of hydrocarbons analyzed singly or in mixtures. Analyses of aromatic hydrocarbons but is linear with concentration. Precision was found to be within + or - 5 percent for standard gas calibrations and generally + or - 10 percent for ambient samples. Accuracy for ambient air samples was determined to be + or - 15 percent by comparison with compound specific GC analysis. Experimental results also show no significant effect from humidity over a wide range of concentrations (75 to 5,000 ppbc). The analytical method is simple, rapid, and cost effective, and the NMOC measurements can be used to establish a basis for control of hydrocarbon emissions in order to meet oxidant criteria levels. Author (GRA)

N83-11622# Environmental Research and Technology, Inc., Westlake Village, Calif.

CRITICAL EVALUATION AND COMPARISON OF MEASURE-

MENT METHODS FOR NITROGENEOUS COMPOUNDS IN THE ATMOSPHERE Final Report
Daniel Grosjean Jan. 1982 125 p refs
(PB82-208646; P-A706-05; CRC-APRAC-CAPA-19-80) Avail: NTIS HC A06/MF A01 CSCL 13B

The method and results of an intensive field study of atmospheric nitrogenous pollutants conducted in Claremont, California are described. Parameters measured included nitric oxide and nitrogen dioxide, peroxyacetylnitrate, and refined particulate nitrate and nitric acid. In addition, a limited number of refined particulate samples collected on quartz filters were analyzed for sulfate and for total carbon. All sampling and monitoring instruments were calibated on site following Environmental Research and Technology's Standard Operating Procedures. Laboratory quality assurance protocols included appropriate calibrations, analysis of blank and field control filters, analysis of EPA audit samples, and replicate analyses. Sampling control experiments included a number of parallel collections on Teflon filters. Author

N83-11623# Lenox Inst. for Research, Inc., Mass.
ALTERNATIVE WATER TREATMENT SYSTEMS USING FLOTATION TECHNOLOGY Research Report, Jun. 1981 - Apr. 1982
Milos Krofta and Lawrence K. Wang 29 Apr. 1982 39 p refs Presented at the Ann. Spring Meeting of the Berkshire District Board of Health Assoc., West Stockbridge, Maine, 29 Apr. 1982
(PB82-211400; LIR04-82-3) Avail: NTIS HC A03/MF A01 CSCL 13B

A feasibility study was conducted for a parallel comparison between conventional water treatment system and innovative flotation system (KROFTA SANDFLOAT). It was concluded that the innovative system is technically feasible for removal of turbidity, color, trihalomethane precursor, trihalomethane, heavy metal (lead), calcium, magnesium, iron and manganese from either surface water or groundwater, and is economically feasible for adoption by small communities. Author

N83-11624# Maine Univ., Orono. Dept. of Geological Sciences.
RESPONSES OF NORTHERN NEW ENGLAND LAKES TO ATMOSPHERIC INPUTS OF ACIDS AND HEAVY METALS
Stephen A. Norton, Ronald B. Davis, David F. Brakke (Huxley College, Bellingham, Wash.), Dennis W. Hanson, Kristin H. Kenlan, and P. Roger Sweets Jul. 1981 102 p refs
(OWRT Proj. A-048-ME(1))
(PB82-211434) Avail: NTIS HC A06/MF A01 CSCL 13B

Ninety-four low humic lakes in northern New England located in largely noncalcareous terrain were studied to detect possible changes in pH and associated effects. Modern colorimetric and electrode pH measurements yield equivalent results + or - 0.1 pH unit, permitting comparison of modern electrode pH measurements with older colorimetric measurements. Eighty-five percent of the lakes are more acidic now. Studies of present water chemistry indicate that Fe, Mn, Pb, Zn, and Al concentrations tend to be higher with decreasing pH for the set of lakes; Na, K, Ca, Mg, and alkalinity tend to be higher with increasing pH for the set of lakes. Surface sediment chemistry indicates that (at the 95% significance level) the concentrations of Na2O, K2O, MgO, and organics are highest at higher lake pH values; Cu increases with decreasing pH. CaO, FeO, MnO, Al2O3, TiO2, Pb, and Zn concentrations do not relate to pH. The relative abundances of taxa of diatom remains in profundal surface sediments from a subset of 25 lakes are discussed. Author

N83-11625# University of South Florida, Tampa. Dept. of Geology.
EVALUATION OF ELECTROMAGNETIC TERRAIN CONDUCTIVITY MEASUREMENTS FOR DETECTION AND MAPPING OF SALTWATER INTERFACES IN COASTAL AQUIFERS
Mark T. Stewart Sep. 1981 69 p refs
(OWRT Proj. A-043-FLA(1))
(PB82-211459; PN-60) Avail: NTIS HC A04/MF A01 CSCL 13B

A rapid, inexpensive electromagnetic method yields results which agree well with geologic and geochemical surveys using direct sampling. The instrument reads directly in conductivity units, and the depth of investigation is constant for a particular spacing and orientation of the receiver and transmitter coils. Data can be obtained and interpreted by personnel with little technical training. Data interpretation normally involves contouring terrain conductivity maps, but quantitative solutions can be obtained where the geoelectric section can be reasonably approximated by a two layer section. Some problems were experienced with interference; however, interference sources usually were very localized and could be avoided. A study in two areas of Florida demonstrates that the EM conductivity method is very useful for rapid, inexpensive ground water surveys where the objective is to locate zones of conductive pore fluids at depths less than 30-40 meters. Author

N83-11626# Lenox Inst. for Research, Inc., Mass.
WATER TREATMENT BY DISINFECTION, FLOTATION AND ION EXCHANGE PROCESS SYSTEM Final Research Report, 1977 - 1982
Lawrence K. Wang and Gary W. Wood (Rensselaer Polytechnic Inst., Troy, N.Y.) May 1982 126 p refs Sponsored by Calspan Corp.
(PB82-213345; LIR-05-82-01) Avail: NTIS HC A07/MF A01 CSCL 13B

Cetyldimethylbenzylammonium chloride, (CDBAC), shows potential as a disinfectant in water and wastewater treatment. Since only a small amount of CDBAC is consumed during the disinfection process, the recovery and possible reuse of CDBAC after disinfection is a practical research objective. Aqueous CDBAC concentrations of 4 and 8 mg/1 are effective for the disinfection of water considered to be a poor source, (i.e. coliform count greater than 5,000 per 100 mg). Since efficient CDBAC removals were achieved at influent-feed CDBAC concentrations of 4 and 8 mg, the combined process of disinfection of water with CDBAC and subsequent removal of CDBAC by an ion-exchange resin shows encouraging potential as a full-scale water purification process or as a purification process for a portable water treatment unit.
Author (GRA)

N83-11627# National Oceanic and Atmospheric Administration, Silver Spring, Md. Atmospheric Turbulence and Diffusion Lab.
ANALYTICAL SOLUTIONS OF A GRADIENT-TRANSFER MODEL FOR PLUME DEPOSITION AND SEDIMENTATION
K. Shankar Rao Sep. 1981 88 p refs
(Contract AD-13-F-0177-0)
(PB82-215153; NOAA-82042003; NOAA-TM-ERL-ARL-109) Avail: NTIS HC A05/MF A01 CSCL 13B

The available methods for including dry deposition in a Gaussian plume model are reviewed. A gradient transfer or K-theory model for the atmospheric transport and ground deposition of gaseous and particulate pollutants emitted from an elevated continuous point source is outlined. The analytical plume diffusion deposition solutions for various stability and mixing conditions are presented. The deposition model was applied to particulate pollutants with appreciable settling velocity and to gases which deposit on ground without settling. Results of ground level concentrations, vertical concentration profiles, surface deposition fluxes, and net deposition and suspension ratios are presented. It is shown that the atmospheric stability and the magnitude of deposition velocity have significant effects on these results. Gravitational settling and deposition velocities in the model are discussed. GRA

N83-11628# Operations Research, Inc., Silver Spring, Md.
SECOND NATIONAL CONFERENCE ON GENERAL AVIATION AIRPORT NOISE AND LAND USE PLANNING: SUMMARY OF PROCEEDINGS Final Report
John Schettino, ed. and Michael Staiano, ed. Apr. 1982 298 p refs Conf. held in New Orleans, 1-3 Dec. 1981
(Contract EPA-68-01-6154)
(PB82-218520; EPA-550/9-82-337) Avail: NTIS HC A13/MF A01 CSCL 13B

The proceedings of the Second National Conference on General Aviation Airport Noise and Land Use Planning are

processed. The implementation of solutions at the State and local level are emphasized. The development of a document dealing with general aviation airport noise and land use planning was discussed. It is suggested that the airport operators and the planners are more knowledgeable in this area due to ANCLUC studies at several general aviation airports. GRA

N83-11629# Bolt, Beranek, and Newman, Inc., Los Angeles, Calif.
NOISE IN AMERICA: EXTENT OF THE NOISE PROBLEM
Miles Simpson and Robert Bruce Sep. 1981 186 p refs Sponsored by EPA
(PB82-219189; EPA-550/9-81-101) Avail: NTIS HC A09/MF A01 CSCL 13B

The number of Americans exposed to various levels of occupational and environmental noise is estimated. Estimates are made for 11 categories of noise producers (e.g., traffic, aircraft, construction) using the yearly day-night sound level (Ldn) or the 24-hour equivalent sound level (Leg) metrics. The assumptions in the models used, including demographic projections, are made explicit for all estimates. Estimates for combined exposures to traffic and other community noise sources are also made, as well as indoor noise exposures from home equipment like fans and clothes washers. According to the estimates, 1.5 million people are exposed to outdoor noise levels (from all sources) of over 75 ldn, and over 90 million, to levels over 58 ldn. Over 9 million people are exposed to occupational noise in excess of 80 dB (Leg(24)). GRA

N83-11630# Environmental Protection Agency, Washington, D.C. Office of Noise Abatement and Control.
GUIDELINES FOR NOISE IMPACT ANALYSIS
Apr. 1982 218 p refs
(PB82-219205; EPA-550/9-82-105) Avail: NTIS HC A10/MF A01 CSCL 13B

Guidelines for procedures which are applicable to the preparation of environmental noise assessments and environmental impact description of noise environment changes are presented. The procedures an objective, and quantitative definition of noise impact and allow the calculation of a single number descriptor which expresses the total noise impact of a proposed project on the population exposer. It is shown that guidelines are further developments of the Fractional Impact Methodology used for assessing the health and welfare effects of a noise environment. Three principal types of noise and vibration environments are considered: general audible noise; special noises; and vibrations. GRA

N83-11631# AeroVironment, Inc., Pasadena, Calif.
SOUTHERN CALIFORNIA OFFSHORE AIR QUALITY MODEL VALIDATION STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report
Paolo Zannetti, David M. Wilbur, and Robert A. Baxter Nov. 1981 11 p refs 4 Vol.
(Contract DI-AA851-CT0-56)
(PB82-190711; AV-FR-81/559-Vol-1; BLM/YV/SR-81/07-Vol-1) Avail: NTIS HC A02/MF A01 CSCL 13B

Models used to predict onshore air quality impacts from outer continental shelf (OCS) emission sources were validated. Field experiments and computer modeling analysis were used to give a better understanding of dispersion over water and at the land/sea interface. In the field experiments performed, a tracer gas (SF6) was released from the research vessel RV/Acania, anchored offshore, with tracer gas samples collected downwind at the surface and aloft, both offshore and onshore. Ambient tracer gas concentrations were measured horizontally (across-wind) and vertically at each of the downwind distances. To determine offshoe gas concentration, repeated syringe 'grab' samples were taken (for later analysis) from a boat at the surface and a continuous tracer gas analyzer was operated in an airplane aloft. To determine tracer gas concentrations onshore at the surface, hourly-averaged syringe samples and repeated syringe 'grab' samples were taken (for later analysis), while another continuous tracer gas analyzer operated in a mobile van and the airplane made transects aloft. GRA

N83-11632# AeroVironment, Inc., Pasadena, Calif.
SOUTHERN CALIFORNIA OFFSHORE AIR QUALITY MODEL VALIDATION STUDY. VOLUME 2: SYNTHESIS OF FINDINGS Final Report
Paolo Zannetti, David M. Wilbur, and Robert A. Baxter Nov. 1981 8 p refs 4 Vol.
(Contract DI-AA851-CT0-56)
(PB82-190729; AV-FR-81/559-Vol-2; BLM/YN/SR-81/08-Vol-2) Avail: NTIS HC A02/MF A01 CSCL 13B

Models commonly used in predicting onshore air quality impacts of OCS emission sources were validated. Field tests and analyses were performed to modify and validate the dispersion aspects of Gaussian and trajectory models. GRA

N83-11633# National Academy of Sciences - National Research Council, Washington, D. C. Polar Research Board.
ARCTIC TERRESTRIAL ENVIRONMENTAL RESEARCH PROGRAMS OF THE OFFICE OF ENERGY RESEARCH, DEPARTMENT OF ENERGY: EVALUATION AND RECOMMENDATIONS. APPENDIX A: TERRESTRIAL ENVIRONMENTAL RESEARCH IN ALASKA DURING 1980-1981
John R. Haugh 1981 224 p refs
(Contract DE-AC01-BOEV-1C453)
(PB82-197096) Avail: NTIS HC A10/MF A01 CSCL 13B

A review of ongoing and planned Arctic terrestrial environmental research in Alaska is provided. The goals, philosophies, and directions of research agencies are reviewed. The financial support provided for Arctic terrestrial environmental research is also reviewed. Author (GRA)

N83-11634# National Academy of Sciences - National Research Council, Washington, D. C. Polar Research Board.
ARTIC TERRESTRIAL ENVIRONMENT RESEARCH PROGRAMS OF THE OFFICE OF ENERGY RESEARCH, DEPARTMENT OF ENERGY: EVALUATION AND RECOMMENDATIONS
1982 80 p refs
(Contract DE-AC01-BOEV-1C453)
(PB82-197088) Avail: NTIS HC A05/MF A01 CSCL 13B

Possible energy related developments in the Arctic are considered. Environmental research related to these activities and a framework for future research are discussed. Up to 50% of the recoverable oil remaining within U.S. jurisdiction may occur in the Arctic, and coal deposits are perhaps equal to those in the continental U.s. However, almost none of the infrastructures of economically developed areas exist, such as communities, roads, refineries, water and waste facilities, and transportation corridors. Integrated ecological studies centered on at least one intensive research site or landscape unit either in the tundra or the taiga or in an area containing both are among the recommendations. Author (GRA)

N83-11635# Technology Service Corp., Santa Monica, Calif.
VALIDATION OF THE EKMA MODEL USING HISTORICAL AIR QUALITY DATA Final Report
John Trijonis and Stan Mortimer Mar. 1982 145 p refs
(Contract EPA-68-02-2976)
(PB82-197187; EPA-600-3-82-015) Avail: NTIS HC A07/MF A01 CSCL 13B

Historical air quality and emissions trend data for the Los Angeles region were used to check the EKMA isopleth method of relating ozone concentration changes to precursor emission changes. Trends in ozone and ozone precursors (NMHC and NOx) were estimated from data for the period 1964 to 1978. Emission trend calculations show that basinwide hydrocarbon emissions decreased continually, with a net reduction of 29% over the study period. Estimated basinwide NOx emissions rose rapidly from the middle 1960s to the early 1970s and then levelled off; the net increase over the study period was 34%. Sensitivity analysis reveal that predicted ozone trends are moderately sensitive to the specific EKMA simulation conditions. Predicted ozone trends are extremely sensitive to the NMHC/NOx ratio. The EKMA model performs fairly well in the validation studies. There is, however, a general tendency for predicted ozone trends to underestimate historical

decreases in actual ozone trends. One reason for the discrepancy appears to be error in the choice of an NMHC/NOx ratio. GRA

N83-11537*# Washington State Univ., Pullman.
IMPACT OF MOUNT ST. HELENS ERUPTION ON ECOSYSTEMS
J. C. Engibous, L. K. Bustad, R. A. Kennedy, G. O. Klock, E. C. Klostermeyer, and R. P. Preston *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 37-42 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11541*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
DUSTSONDE MEASUREMENTS OF THE MOUNT ST. HELENS VOLCANIC DUST CLOUD OVER WYOMING
James M. Rosen and D. J. Hofmann *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 65-82 refs Sponsored in part by NSF, NOAA, and ONR (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11542*# Los Alamos Scientific Lab., N. Mex.
PHYSICAL AND CHEMICAL CHARACTERISTICS OF MOUNT ST. HELENS AIRBORNE DEBRIS
W. A. Sedlacek, G. H. Heiken, Eugene J. Mroz, E. S. Gladney, D. R. Perrin, Robert Leifer, I. Fisenne, L. Hinchliffe, and R. L. Chuan *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 83-107 refs Previously announced as N81-20613 Prepared in cooperation with DOE, New York and Chuan (R. L.) (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11543*# Institute for Atmosphere Optics and Remote Sensing, Hampton, Va.
SAGE MEASUREMENTS OF MOUNT ST. HELENS VOLCANIC AEROSOLS
G. S. Kent *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 109-115 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11545*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROUND-BASED AND AIRBORNE MEASUREMENTS OF THE MOUNT ST. HELENS STRATOSPHERIC EFFLUENTS
M. P. McCormick *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 125-130 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11547*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MOUNT ST. HELENS PLUME DISPERSION BASED ON TRAJECTORY ANALYSES
Edwin F. Danielsen *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 141-153 (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11548*# National Center for Atmospheric Research, Boulder, Colo.
A COMPARISON OF CONSTITUENTS OF MOUNT ST. HELENS ERUPTION CLOUDS WITH THOSE OF SOME OTHER VOLCANOES
Richard D. Cadle and Leroy Heidt *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 155-159 refs Sponsored in part by NSF (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11553*# Atmospheric Environment Service, Downsview (Ontario).
MEASUREMENTS OF SO2 IN THE MOUNT ST. HELENS DEBRIS
J. B. Kerr, F. J. Evans, and C. L. Mateer *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 219-223 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11555*# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
MOUNT ST. HELENS DUST VEIL OBSERVED AT BOULDER, COLORADO BY OPTICAL TECHNIQUES
Gordon Lerfald *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 241-250 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRCRAFT SAMPLING OF THE SULFATE LAYER NEAR THE TROPOPAUSE FOLLOWING THE ERUPTION OF MOUNT ST. HELENS
Erwin A. Lezberg, Dumas A. Otterson, William K. Roberts, and Leonidas C. Papathakos *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 251-259 refs Originally announced as 82A-37450 (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11557*# Naval Weapons Center, China Lake, Calif. Earth and Planetary Sciences Div.
AN INCURSION OF DUST IN THE SOUTHWESTERN UNITED STATES FROM APRIL 1980 ERUPTIONS OF MOUNT ST. HELENS
Larry A. Mathews, G. R. Roquemore, P. St.Amand, and J. P. Gibson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 261-267 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11558*# Battelle Pacific Northwest Labs., Richland, Wash. Space Sciences Section.
MOUNT ST. HELENS RELATED AEROSOL PROPERTIES FROM SOLAR EXTINCTION MEASUREMENTS
J. J. Michalsky, E. W. Kleckner, and G. M. Stokes *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 269-273 refs Previously announced as 81N-24610 Sponsored in part by DOE (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11560*# Battelle Pacific Northwest Labs., Richland, Wash.
AMBIENT AIRBORNE SOLIDS CONCENTRATIONS INCLUDING VOLCANIC ASH AT HANFORD, WASHINGTON SAMPLING SITES SUBSEQUENT TO THE MOUNT ST. HELENS ERUPTION
George A. Sehmel *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 283-291 refs (For primary document see N83-11534 02-42)
(Contract DE-AC06-76RL-01830)
Avail: NTIS HC A13/MF A01 CSCL 13B

N83-11561*# East Anglia Univ., Norwich (England). Climatic Research Unit.
THE FORMULATION OF LAMB'S DUST VEIL INDEX

P. M. Kelly and C. B. Sear *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 293-298 refs (For primary document see N83-11534 02-42)
(Grant N00014-77-G-0074)
Avail: NTIS HC A13/MF A01 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-11636# National Research Inst. for Oceanology, Stellenbosch (South Africa). Estuarine and Coastal Research Unit.
A REVIEW OF THE GEOLOGY OF THE CAPE WEST COAST (ORANGE RIVER TO BERG RIVER)
B. D. Coward Sep. 1981 79 p refs
(CSIR-T/SEA-8115; ISBN-0-7988-2180-9) Avail: NTIS HC A05/MF A01

A review of the Cape West Coast of the Republic of South Africa from the Orange to the Berg Rivers is given. Morphometry of the Orange estuary is given. Bathymeteric data is given. The geomorphology of the region and a description of geologic formations is given. Sedimentation and sandbars are discussed. R.J.F.

N83-11637# Magnetic Observatory, Hermanus (South Africa).
MAGNETIC OBSERVATORY Annual Report, 1980 - 1981
1981 35 p
(CSIR-SR-MAG-2; ISBN-0-7988-2253-8) Avail: NTIS HC A03/MF A01

Disturbed conditions of the magnetic field such as magnetospheric substorm phenomena, and in particular low latitude magnetic pulsations and proton aurora observed in Antarctica are studied. In addition attention is given to magnetic quiet time variations and also to electric currents induced in the crust of the Earth by variations of the geomagnetic field (telluric currents). S.L.

N83-11638# Geological Survey, Washington, D. C.
GEOLOGICAL STUDIES OF THE COST NUMBERS G-1 AND G-2 WELLS, UNITED STATES NORTH ATLANTIC OUTER CONTINENTAL SHELF
Peter A. Scholle, ed. and Chiye R. Wenkam, ed. 1982 200 p refs
(USGS-Circ-861) Avail: NTIS HC A09/MF A01

Measurements of vitrinite reflectance, color alteration of visible organic matter, and various organic geochemical properties suggest that the tertiary and cretaceous strata of the COST Nos. G-1 and G-2 are not prospective for oil and gas. These sediments were not buried deeply enough for hydrocarbon generation, and the kerogen and extractable organic matter in them are thermally immature. However, the Jurassic rocks at the G-1 site do contain small amounts of thermally mature gas prone kerogens. The Jurassic rocks at COST No. G-2 are also gas prone and are slightly richer in organic carbon and total extractable hydrocarbons than the G-1 rocks, but both sites have only poor to fair oil and gas source rock potential. S.L.

N83-11639# Geological Survey, Washington, D. C.
GEOGRAPHIC RESEARCH IN THE US GEOLOGICAL SURVEY: BIBLIOGRAPHY, 1966 - 1980
Mary E. Graziani 1982 63 p
(USGS-Circ-865) Avail: NTIS HC A04/MF A01

Geographic research, particularly research utilizing remotely sensed data is reported in approximately 390 references. Testing the use of satellite and high altitude remotely sensed data in a geographic context is covered. N.W.

N83-11640# Geological Survey, Washington, D. C.
EARTHQUAKES IN THE UNITED STATES, JANUARY - MARCH 1981
J. H. Minsch, C. W. Stover, P. K. Dunbar, and F. W. Baldwin Aug. 1982 39 p refs
(USGS-Circ-871-A) Avail: NTIS HC A03/MF A01

A tabular listing of earthquakes in chronological order by state is provided. Date, origin time, hypocenter, magnitude, maximum intensity, and computational source of the hypocenter are included. Intensity in formation is also provided. N.W.

N83-11641*# California Inst. of Tech., Pasadena. Seismological Lab.
EARTHQUAKE RESEARCH: PREMONITORY MODELS AND THE PHYSICS OF CRUSTAL DISTORTION Final Report, Jan. 1978 - Dec. 1979
James H. Whitcomb (Colorado Univ., Boulder) [1981] 17 p refs (Grant NsG-5224)
(NASA-CR-169467; NAS 1.26:169467) Avail: NTIS HC A02/MF A01 CSCL 08K

Seismic, gravity, and electrical resistivity data, believed to be most relevent to development of earthquake premonitory models of the crust, are presented. Magnetotellurics (MT) are discussed. Radon investigations are reviewed. N.W.

N83-11642# SRI International Corp., Menlo Park, Calif.
PARAMETERS FOR OZONE PHOTOLYSIS AS A FUNCTION OF TEMPERATURE AT 280-330 NM, REVISION Final Report, Sep. 1978 - Mar. 1980
John E. Davenport May 1982 43 p refs
(Contract DOT-FA78WA-4263)
(AD-A117502; FAA-EE-80-44-Rev) Avail: NTIS HC A03/MF A01 CSCL 07/5

This study was undertaken to obtain the parameters for ozone photolysis in the 280-330 nm region as a function of temperature in the 200-300 K range. The absolute absorption coefficients for 03 were measured at 298, 271, 225, and 206 K and were tabulated at 1-nm intervals over the 250-370 nm wavelength range. Uncertainties in the absorption coefficients range from 2% at room temperature to about 14% at 206 K and mainly fall in the 3-7% range. Pressure of 0.02-100 torr ozone were used, and no pressure effect was observed up to 800 torr N2. GRA

N83-11643# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ATMOSPHERIC ABSORPTION CELL CHARACTERIZATION M.S. Thesis
Jun. 1982 93 p refs
(AF Proj. 7633)
(AD-A118062; AFIT/GEP/PH/82J-1) Avail: NTIS HC A05/MF A01 CSCL 04/1

The measurement capability of the Avionics Laboratory IR Facility was used to evaluate an absorption cell that will be used to simulate atmospheric absorption over horizontal paths of 1 - 10 km in length. Band models were used to characterize the transmittance of carbon dioxide (CO2), nitrogen (N2), and nitrous oxide (N2O) in the cell. The measured transmittance was compared to the calculated values. Nitrous oxide is important in the 4 - 4.5 micron range in shaping the weak line absorption of carbon dioxide. The absorption cell is adequate for simulating atmospheric absorption over these paths. Author (GRA)

N83-11644*# Naval Research Lab., Washington, D. C. Geophysical and Plasma Dynamics Branch.
A DYNAMIC MODEL FOR THE AURORAL FIELD LINE PLASMA IN THE PRESENCE OF FIELD-ALIGNED CURRENT Interim Report
H. G. Mitchell, Jr. and P. J. Palmadesso 23 Jul. 1982 25 p refs
(Contract NASW-14365; RR0330244)
(NASA-CR-169382; NAS 1.26:169382; AD-A118298;
NRL-MR-4840) Avail: NTIS HC A02/MF A01 CSCL 08/14

We have developed a dynamic numerical model of the plasma along an auroral field line in order to provide a vehicle for studying ionosphere-magnetosphere coupling processes. The model is a multi-moment multi-fluid approximation of a gyrotropic plasma

consisting of three species (electrons, hydrogen ions, oxygen ions) along a segment of auroral magnetic field line extending from an altitude of 800 km to 18 earth radii. We have performed preliminary simulations for the case of a current-free polar wind equilibrium of the field line plasma and the case in which a large upward field-aligned current is applied to the field line. In the former case, the agreement between our model and previous static results is reasonable given the differing boundary conditions inherent in the two cases. In the case of field-aligned current, we note that the flux tube plasma responds to the current on several time scales. After an initial rapid response due to electron-ion Joule heating, thermal oscillations of the flux tube plasma persist on time scales of the order of one hour, illustrating the complicated nature of the response of a collisionless plasma when heat flow transport is treated in a dynamic manner. Author (GRA)

N83-11645# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

EVALUATION OF METHODS FOR CALCULATING SOIL THERMAL CONDUCTIVITY

Omar T. Farouki Mar. 1982 100 p refs

(DA Proj. 1T6-65803-M-761)

(AD-A117889; CRREL-82-8) Avail: NTIS HC A05/MF A01 CSCL 08/7

A detailed analysis of methods for calculating the thermal conductivity of soils is presented, and trends in the predictions of these methods are compared. The influence of changes in the moisture content on the calculated thermal conductivity of a soil (at constant dry density) is shown as is the sensitivity of this calculated value to changes in dry density or in the soil solids' thermal conductivity. The methods are evaluated to determine the extent of agreement of their predictions with measured values obtained on soils of known composition and properties. The deviations of the predicted values are determined for soils that are unfrozen or frozen, coarse or fine, unsaturated, saturated or dry. The applicability of each of the methods under various conditions is determined and recommendations are made as to the best method for each condition. Author (GRA)

N83-11646# Teledyne Geotechnical, Alexandria, Va. Seismic Data Analysis Center.

Q OF THE EARTH IN THE 0.5-10Hz BAND

Z. A. Der, D. W. Rivers, T. W. McElfresh, A. O'Donnell, and P. J. Klouda VELA Seismological Center 16 Oct. 1981 100 p refs

(Contract F08606-79-C-0007; ARPA Order 2551)

(AD-A117712; SDAC-TR-81-11; VSC-TR-82-7) Avail: NTIS HC A05/MF A01 CSCL 08/7

The study of spectral characteristics of short period body waves using a worldwide data set indicates that the high frequency fall-off rates of body wave spectra correlate with the tectonic regime of the upper mantle structures traversed. The study also shows, in a consistent manner, that this is due to lateral variations of omega in the mantle. The magnitude of the worldwide omega variations in the mantle is of the same order as that previously observed for the United States. The internal consistency of the observations is such that crustal and site effects and instrument nonlinearity can be ruled out as factors significantly affecting the t estimates obtained. GRA

N83-11647# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.

NORTH SEA PROJECT 2: A SURVEY OF THE AUTUMN 1981 MEASUREMENTS

G. deLeeuw Jan. 1982 43 p refs

(Contract A79/KM/075)

(PhL-1982-03; TDCK-76154) Avail: NTIS HC A03/MF A01

In order to determine optical parameters of the atmosphere, with emphasis on extinction in the infrared, aerosol size distributions were measured at and around the North Sea. For evaluation of the results, meteorological parameters were recorded while lidar or transmission measurements were also performed. Data were recorded at four stations as well as aboard a corvette of the Royal Netherlands Navy which sailed between those stations. In addition, airborne measurements were performed. The meteorological parameters which were recorded during this period are surveyed. Typical examples of the measured aerosol size distributions are shown as well as results of Mie calculations which were applied to these distributions. Author (ESA)

N83-11648# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.

A STATISTICAL PRESENTATION OF THE NETHERLANDS OPAQUE TRANSMITTANCE MEASUREMENTS

H. M. J. vanDongen Apr. 1982 60 p refs

(Contract A80/KL/029)

(PhL-1982-16; TDCK-76477) Avail: NTIS HC A04/MF A01

Transmittance was measured in three regions of the electromagnetic spectrum: 8 to 12 micrometers, 3.4 to 5.0 micrometers, and the visible spectrum. Application possibilities of the OPAQUE data base are pointed out. It can be used for statistical studies, dealing with visible and infrared transmittances, e.g., operations research studies. The results of the total four year measurement period are presented in the form of six different kinds of plots. Author (ESA)

N83-11649# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.

THE AEROSOL PARTICLE SIZE DISTRIBUTIONS IN THE OPAQUE DATA PACKAGE AND THE COMPARISON BETWEEN THE CALCULATED AND MEASURED TRANSMITTANCES (VISUAL AND INFRARED)

D. G. Hemmes Apr. 1982 114 p refs

(PhL-1982-17; TDCK-76391) Avail: NTIS HC A06/MF A01

Results of the analysis of the aerosol data in the OPAQUE data package are presented. The aerosol data are checked, recalibrated, and examined for special features. Visible and IR transmittances are calculated, using both the standard models in the LOWTRAN 5 computer program and a modified program which uses measured particle size distributions. The calculated results are compared with the measured values. Author (ESA)

N83-11650# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.

A COMPREHENSIVE SURVEY OF THE NETHERLANDS OPAQUE TRANSMITTANCE MEASUREMENTS, PART 2

H. M. J. vanDongen Apr. 1982 74 p refs

(Contract A74/K/079)

(PhL-1982-18; TDCK-76392) Avail: NTIS HC A04/MF A01

Transmittances were measured in four regions of the electromagnetic spectrum: visual, 4.0 to 4.1 micrometers, 3.4 to 5.0 micrometers, and 8 to 12 micrometers. Monthly histograms of the frequency and cumulative distributions as well as annual surveys are given for a one-year period. Daily surveys are provided for the whole OPAQUE measurement four-year period. Author (ESA)

N83-11651# National Oceanic and Atmospheric Administration, Miami, Fla. Environmental Research Labs.

ELECTRICAL RESISTIVITY/CONDUCTIVITY OF SUBMARINE SEDIMENTS MEASURED BY IN SITU TECHNIQUES

Matthew H. Hulbert, Douglas N. Lambert, Richard H. Bennett, G. L. Freeland, John T. Burns, and W. B. Sawyer Dec. 1981 54 p refs

(PB82-194994; NOAA-82031201; NOAA-TR-ERL-416-AOML-31) Avail: NTIS HC A04/MF A01 CSCL 08G

An in situ four electrode contact resistivity probe system was designed, fabricated, and field tested for use in coarse grained carbonate sediments. The probe was designed to be driven to selected depths below the seafloor using a standard Vibracore system. In situ measurements of resistivity were recorded on board ship by precision electronic equipment consisting of signal generators and processors, and by temperature monitoring systems, which were hard wired to the probe. Resistivity measurements were made at six sites in carbonate sediments off South Florida to a maximum depth of penetration of about 17 feet. Average values of conductivity ranged between 0.88 and 1.21 mho/m. The seabed was found to be composed of alterna-

ting layers of relatively high conductivity material (0.8 to 1.4 mho/m) in thicknesses of a few feet and layers about 1 ft thick having relatively low conductivities in the range of 0.4 to 0.8 mho/m.
Author (GRA)

N83-11652# California Inst. of Tech., Pasadena. Earthquake Engineering Research Lab.
SILENT BOUNDARY METHODS FOR TRANSIENT WAVE ANALYSIS Ph.D. Thesis
Martin Cohen Sep. 1980 216 p refs
(Grant NSF PFR-77-23687)
(PB82-201831; NSF/RA-800641; EERL-80-09) Avail: NTIS HC A10/MF A01 CSCL 08K

A dynamic model is developed that is designed to absorb infinitely radiating waves in a finite, computational grid. The analysis studies the problem of soil structure interaction, where energy propagates outward, from a region near a structure, toward the boundaries. The proposed method, the extended paraxial boundary, is derived from one directional wave theories. The extended paraxial boundary is compared, both analytically and numerically, with two other transmitting boundaries, the standard viscous and unified viscous methods. Analytical results indicate that the extended paraxial boundary enjoys a distinct advantage in cancelling wave reflections. Numerical tests reveal a small superiority over the viscous approaches. The relationship between the silent boundaries and Rayleigh waves, spherically symmetric and axially symmetric waves, nonlinear waves, anisotropic media, and numerical stability are discussed. GRA

N83-11653# Texas Univ., Austin. Bureau of Economic Geology.
GEOLOGIC STUDIES OF GEOPRESSURED AND HYDROPRESSURED ZONES IN TEXAS: TEST WELL SITE SELECTION Final Report, Jan. 1979 - May 1980
B. R. Weise, M. B. Edwards, A. R. Gregory, H. S. Hamlin, L. A. Jirik, and R. A. Morton Sep. 1981 334 p refs
(GRI-5011-321-0125)
(PB82-220542; GRI-80/0048) Avail: NTIS HC A15/MF A01 CSCL 08I

Sites for test wells that will be capable of long term production of methane bearing water from the shallow geopressured and deep hydropressured zones were identified. Test well site selection to obtain knowledge of shallow geopressured and deep hydropressured aquifers included: (1) zones within the geopressured and deep hydropressured section of the Texas Gulf Coast Tertiary were defined on the basis of pressure gradients and temperatures; (2) high sandstone corridors were identified for each of these zones; (3) five fairways, or areas of greatest net sandstone thickness, were located within the corridors, areas most prospective for testing entrained methane resources in the shallow geopressured and deep hydropressured zones were identified in each fairway; (4) test sites were selected in four of the prospect areas. Data gained from these geologic studies and testing will be significant in the evaluation of the technical and economic feasibility of producing solution gas from the shallow geopressured and deep hydropressured zones and comparison of these zones with deeper, hotter geopressured zones as sources of entrained methane. GRA

N83-11654# Geological Survey, Arvada, Colo.
UNITED STATES EARTHQUAKES, 1979
Carl W. Stover and Carl A. vonHake 1981 183 p refs
(PB82-202334; NOAA-82040707) Avail: NTIS HC A09/MF A01 CSCL 08K

All earthquakes that were reported felt in the United States and nearby territories in 1979 are described. A summary of macroseismic data reported for each earthquake and a chronological list of earthquakes by State are given. The results from local seismic networks are summarized. Information on crustal movement studies, tsunamis, and principal earthquakes of the world is given. Each description includes data, origin time, hypocenter, and the source of the hypocenter computation, maximum intensity (Modified Mercalli), and macroseismic effects reported in the area. GRA

N83-11655# Institute for Telecommunication Sciences, Boulder, Colo.
THE USE OF THEORETICAL MODELS TO IMPROVE GLOBAL MAPS OF foF2
Charles M. Rush, Margo Pokempner, David N. Anderson, and F. G. Stewart Jan. 1982 50 p refs
(PB82-187170; NTIA-82-93) Avail: NTIS HC A03/MF A01 CSCL 04A

In this report, the resuls of a study to improve the global maps of monthly median values of the F2 region critical frequency, foF2, using values determined from a theoretical model, are presented. The object of the study was to obtain values of the mid-latitude F-region critical frequency which could be used to improve the prediction of ionospheric parameters in regions of the earth inaccessible to ground-based measurements. This was accomplished by including, into the theoretical calculations, realistic physical processes along with a realistic geomagnetic field model. Parameters were adjusted so that agreement was achieved between calculated and observed foF2 values as a function of local time at different stations and then these same input parameters (i.e., neutral wind field, neutral atmospheric model, electrodynamic drift) were assumed valid at all regions of interest where the major difference is the gemagntic field line configurations. Coefficients that yield global representations of foF2 were then determined using the theoretically derived foF2 values, and the predicted critical frequencies compared with observed values to estimate the degree of improvement. Autho (GRA)

N83-11656# Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
PROGRESS OF REGULATIONS TO PROTECT STRATOSPHERIC OZONE. REPORT TO CONGRESS
Feb. 1982 32 p refs
(PB82-194036; EPA-560/1-82-003) Avail: NTIS HC A03/MF A01 CSCL 04A

Activities related to the reduction of stratospheric ozone from potential depletion due to emissions of chlorofluorocarbons (CFCs) and other ozone-depleting substances are reviewed. Author (GRA)

N83-11657# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
RECOGNIZING AND REDUCING IONOSPHERIC DISTORTION OF SKYWAVE RADAR SEA-ECHO SPECTRA-RECOMMENDED TESTS WITH SYNTHETICALLY DISTORTED SPECTRA
R. M. Jones, T. M. Georges, and J. P. Riley Jan. 1982 26 p refs
(PB82-194721; NOAA-82030403; NOAA-TM-ERL-WPL-90) Avail: NTIS HC A01/MF A01 CSCL 04A

Specific plans are presented for synthetically distorting measured sea-echo spectra with measured ionospheric distortion and for using the resulting spectra with known ionospheric distortion to test methods for recognizing and reducing ionospheric distortion in sea-echo spectra. This procedure appears to be the most reliable way to evaluate strategies to deal with ionospheric distortion in HF skywave sea state radar Doppler spectra. Author

N83-11658# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
INTERNATIONAL REFERENCE IONOSPHERE: IRI 79. REPORT OF URSI WORKING GROUP G.4
J. Virginia Lincoln, ed. and Raymond O. Conkright, ed. Nov. 1981 253 p refs
(PB82-196395; NOAA-82021001; UAG-82) Avail: NTIS HC A12/MF A01 CSCL 04A

The aim of the international reference ionosphere (IRI) is to establish a summary compendium of height profiles through the ionosphere for the four main plasma parameters, namely: plasma density, plasma temperatures of electrons and ions, and ion composition. The parameters are generated from a descriptive model which contains data that can be extracted and used to obtain average profiles. The IRI generated parameters compare well with COSPAR international reference atmosphere (CIRA)

values. The emphasis of IRI is to summarize reliable experimental data when available. GRA

N83-11535*# Michigan Technological Univ., Houghton.
THE 18 MAY 1980 ERUPTION OF MOUNT ST. HELENS: THE NATURE OF THE ERUPTION, WITH AN ATMOSPHERIC PERSPECTIVE
William I. Rose, Jr. and M. F. Hoffman *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 1-14 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08K

N83-11539*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PRECURSOR GASES OF AEROSOLS IN THE MOUNT ST. HELENS ERUPTION PLUMES AT STRATOSPHERIC ALTITUDES
Edward C. Y. Inn, J. F. Vedder, E. P. Condon, and D. O'Hara (LFE Corp.) *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 47-54 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

N83-11540*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TIME VARIATIONS OF AEROSOLS IN THE STRATOSPHERE FOLLOWING MOUNT ST. HELENS ERUPTIONS
Neil H. Farlow, Kenneth G. Snetsinger, Verne R. Oberbeck, Guy V. Ferry, George Polkowski, and Dennis M. Hayes *In its* Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 55-64 refs Prepared in cooperation with LFE Corp. (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

N83-11544*# National Oceanic and Atmospheric Administration, Boulder, Colo.
MEASUREMENTS OF STRATOSPHERIC AEROSOLS OVER MAUNA LOA, HAWAII AND BOULDER, COLORADO
John J. Deluisi, Bernard G. Mendonca, and Kirby J. Hanson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 117-123 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

N83-11549*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION STUDIES OF THE PHYSICAL AND CHEMICAL PROCESSES OCCURRING IN THE STRATOSPHERIC CLOUDS OF THE MOUNT ST. HELENS ERUPTIONS OF MAY AND JUNE 1980
Richard P. Turco (R and D Associates), Owen B. Toon, C. Whitten, R. G. Keesee, and P. Hamill (Systems and Applied Sciences Corp.) *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 161-189 refs (For primary document see N83-11534 02-42)
(Contract NAS2-9881)
Avail: NTIS HC A13/MF A01 CSCL 04A

N83-11552*# New York State Univ., Albany. Atmospheric Sciences Research Center.
THE MECHANISMS OF FINE PARTICLE GENERATION AND ELECTRIFICATION DURING MOUNT ST. HELENS VOLCANIC ERUPTION
Roger J. Cheng *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 211-217 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 08K

N83-11554*# Battelle Pacific Northwest Labs., Richland, Wash.
ASH LOADING AND INSOLATION AT HANFORD, WASHINGTON DURING AND AFTER THE ERUPTION OF MOUNT ST. HELENS
N. S. Laulainen *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 225-240 refs (For primary document see N83-11534 02-42)
(Contract DE-AC06-76RL-01830)
Avail: NTIS HC A13/MF A01 CSCL 08K

N83-11559*# California Univ., Livermore. Lawrence Livermore Lab.
DEPOSITION AND DOSE FROM THE 18 MAY 1980 ERUPTION OF MOUNT ST. HELENS
Kendall R. Peterson *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 275-281 refs (For primary document see N83-11534 02-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A13/MF A01 CSCL 08K

N83-11562*# Institut d'Aeronomie Spatiale de Belgique, Brussels.
FORWARD SCATTERING AND BACKSCATTERING OF SOLAR RADIATION BY THE STRATOSPHERIC LIMB AFTER MOUNT ST. HELENS ERUPTION
M. Ackerman and C. Lippens *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 299-303 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-11659# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PROCEDURE FOR THE INSTALLATION OF A DATA COLLECTION PLATFORM FOR THE PCD/TOCANTINS PROJECT [PROCEDIMENTO PARA INSTALACAO DA PLATAFORMA DE COLETA DE DADOS DO PROJETO PCD/TOCANTINS]
Eduardo Mena Barreto Alonso Jun. 1982 21 p In PORTUGUESE; ENGLISH summary
(INPE-2448-NTE/187) Avail: NTIS HC A02/MF A01

The procedures for the installation of a data collection platform to be used in the river Tocantins basin, located at the Amazon regions are described. R.J.F.

N83-11660# National Electrical Engineering Research Inst., Pretoria (South Africa).
THE DEVELOPMENT AND TESTING OF LIGHTNING FLASH COUNTERS IN THE REPUBLIC OF SOUTH AFRICA DURING 1980 - 198 Final Report
R. B. Anderson, H. Kroeninger, D. V. Meal, and M. A. Smith Sep. 1981 49 p refs
(CSIR-SR-ELEK-227) Avail: NTIS HC A03/MF A01

A program of measurement and research with lightning flash counters is discussed. A survey of the lightning flash density of the Republic of South Africa and of South West Africa (Namibia) is discussed. Detailed lightning statistics for the Pretoria area of the Transvaal Province are given. A research program covering the characteristics of lightning flash counters, including counters for cloud flash density and for counting positive and negative ground flashes separately, is discussed. In the national survey the results from 380 field counters for another year are added to the previous year's data and a map for the six years ending June 1981 was completed. Comparisons are made between CIGRE 500 Hz and 10 kHz counters at several situations. R.J.F.

N83-11661*# Electro Magnetic Applications, Inc., Denver, Colo.
INTERPRETATION METHODOLOGY AND ANALYSIS OF IN-FLIGHT LIGHTNING DATA Final Report
Terence Rudolph and Rodney A. Perala Washington NASA Oct. 1982 181 p refs Prepared for Research Triangle Inst., Research

Triangle Park, N.C.
(Contract NAS1-16489)
(NASA-CR-3590; NAS 1.26:3590; EWA-82-R-21) Avail: NTIS HC A09/MF A01 CSCL 04B

A methodology is presented whereby electromagnetic measurements of inflight lightning stroke data can be understood and extended to other aircraft. Recent measurements made on the NASA F106B aircraft indicate that sophisticated numerical techniques and new developments in corona modeling are required to fully understand the data. Thus the problem is nontrivial and successful interpretation can lead to a significant understanding of the lightning/aircraft interaction event. This is of particular importance because of the problem of lightning induced transient upset of new technology low level microcircuitry which is being used in increasing quantities in modern and future avionics. Inflight lightning data is analyzed and lightning environments incident upon the F106B are determined. B.W.

N83-11662*# National Aeronautics and Space Administration, Washington, D. C.
ACCURACY, REPRODUCIBILITY, AND VERTICAL RESOLUTION OF DATA FROM RADIOSONDES
Hans Richner Oct. 1982 11 p refs Transl. into ENGLISH from "Genauigkeit, Reproduzierbarkeit und Vertikale Aufloesung der Daten aus Radiosondierrungung" Soc. Meteorol. Palatina (West Germany), 1980 p 1780 - 1795 Proc. of Symp. Anlaessich der 200 Wiederkehr des Gruendungjahres des Soc. Meteorol. Palatina, Manheim, West Germany, 1980 Translation was announced as N82-20740 Transl. by Scientific Translation Services, Santa Barbara, Calif. Orig. doc. prepared by Lab. for Atmospheric Physics ETH, Zurich
(Contract NASw-3542)
(NASA-TM-76949; NAS 1.15:76949) Avail: NTIS HC A02/MF A01 CSCL 04B

Three radiosonde systems were compared to determine data deviations as well as their reproducibility. Basic considerations regarding a possible vertical resolution are followed by a suggestion as to how the ascent velocity of the balloon could be utilized to determine vertical winds. A.R.H.

N83-11663# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Science and Technology Lab.
OPERATION AND MAINTENANCE MANUAL FOR THE ATMOSPHERIC PROFILER SYSTEM
B. E. Eckstein, C. R. Holland, and R. L. Williams Jul. 1982 23 p (AD-A118162; NORDA-TN-164) Avail: NTIS HC A02/MF A01 CSCL 04/2

An atmospheric profiler system for measuring wind shear in the first 100 meters above the ocean surface was developed in FY 82 by the Instrumentation Branch (Code 352), Ocean Technology Division, Naval Ocean Research and Development Activity. The delivered system consists of four multi-sensor, self-contained, telemetry units, which can be suspended from the tether of a buoyant balloon, and a four-frequency receiving subsystem. Each telemetry unit measures air temperature and wind speed; one of the units also measures barometric pressure. The sensor signals are composited in each of the units, and radio frequency is transmitted to a distant receiver. At the receiver site, the individual sensor signals are presented at the back of the receiver unit as analog signals ready for further processing and display. GRA

N83-11664# Battelle Pacific Northwest Labs., Richland, Wash.
THE USE OF FALLOUT METEOROLOGICAL MESSAGE FOR HIGH ALTITUDE BALLISTIC TRAJECTORIES Final report
T. J. Bander and W. E. Davis White Sands Missile Range, N. Mex. ASL Jun. 1982 29 p refs
(Contract DAAG29-76-D-0100)
(AD-A118127; ERADCOM/ASL-CR-82-0100-2) Avail: NTIS HC A03/MF A01 CSCL 19/4

As projectiles of new weapons systems traverse altitude ranges of 20 to 30 km, where no meteorological information exists for ballistics, meteorological information is necessary in this range to assist in targeting the weapon. An algorithm has been developed and tested using the information available about the windspeed and direction from the fallout meterological message as input into ballistic equations. As a result of using this information, the comparisons with the current default techniques shows an increased accuracy < or = 25 percent. When climatological values of temperature and density are used with the winds from the fallout meteorological message, an increased accuracy of < or = 30 percent over default is obtained. Another technique using extrapolation of meteorological data with the fallout met message winds realized a 90 percent improvement over default.
Author (GRA)

N83-11665 Air Force Environmental Technical Applications Center, Scott AFB, Ill.
A COMPARISON OF THE AFGL FLASH, DRAPER DART AND AWS HAZE MODELS WITH THE RAND WETTA MODEL FOR CALCULATING ATMOSPHERIC CONTRAST REDUCTION
Patrick J. Breitling Mar. 1982 55 p refs Presented at the 8th Tech. Exchange Conf., Colorado Springs, 28 Nov. - 1 Dec. 1978
(AD-A118425; AD-E850180; USAFETAC/TN-82-001) Avail: NTIS HC A04/MF A01 CSCL 04/2

In 1975 the US Air Force Environmental Technical Applications Center (USAFETAC) was tasked to develop a model to calculate the lock-on range for TV-guided precision guided munitions. Investigation revealed the availability of several models for calculating contrast reduction by the atmosphere. These models, the Air Fore Geophysics Lab (AFGL) Flash model, the Air Weather Service (AWS) Haze Model, the Draper Lab Dart model, and the Rand Corp. WETTA model, were compared with one another using the same input data. The FLASH Monte Carlo model was assumed as the standard for the comparison. Visible Contrast transmission values were computed for all models for a TV sensor at 12,000 feet AGL, for two mixing depths (200 and 1500 meters), two visibilities (5 and 23 kilometers), three solar zenith (20, 60, and 85 degrees), three albedos (.06,.18, and .80), and seven dive angles (85, 70, 50, 30, 20, 10 and 7 degrees). If one accounts for the difference in optical depths which results from Huschke's (Rand Corp.) stair step treatment of vertical extinction coefficients, his model does an acceptable job of approximating FLASH contrast transmission values for a visibility of 23 kilometers. When the visibility is 5 kilometers, the agreement is not as good due to a combination of mathematical and geometrical factors. GRA

N83-11666# Weather Wing (1st), Hickam AFB, Hawaii.
TROPICAL CYCLONE INTENSITY ESTIMATION BY USING THE DVORAK TECHNIQUE WITH VISUAL SATELLITE IMAGERY
Donald R. Cochran 15 Dec. 1981 16 p
(AD-A118426; AD-E850182; Rept-1WW/TN-81/001) Avail: NTIS HC A02/MF A01 CSCL 04/2

In 1975, V. Dvorak published a technique for estimating the current intensity of tropical cyclones by using satellite imagery. Measurement of certain cloud features indicate current wind speeds. A 'model' development theory and picture clues contribute information on past and future trends. Dvorak's latest revisions are discussed and the current operational procedures for use with visual imagery are offered. GRA

N83-11667# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
OBJECTIVE ANALYSIS OF CLIMATOLOGICAL PROBABILITY DATA Final Report, Jan. 1981 - Mar. 1982
Bryan E. Lilius, Frederick C. Wirsing, and Robert M. Cox Jul. 1982 105 p refs
(AF Proj. 2502)
(AD-A118429; AD-E850181; USAFETAC/TN-82-003) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report describes a method for compacting, accessing, and objectively analyzing ceiling/visibility probability data. Unconditional cumulative probabilities over the southern half of West Germany are analyzed. The technique used to compact the data uses less than one-eighth of the computer storage normally required. The accuracy of the data was only slightly impaired.

Three objective analysis algorithms were investigated; Barnes, Janota, and nearest neighbor. The Barnes method performed best. Independent data were estimated, using this technique with a mean error of 3.2 percent. GRA

N83-11668# Air Force Geophysics Lab., Hanscom AFB, Mass. Cloud Physics Branch.

SNOW CHARACTERIZATION MEASUREMENTS OF SNOW ONE-A

Robert O. Berthel 8 Apr. 1982 20 p refs
(AF Proj. 6670)
(AD-A118140; AFGL-TR-82-0203) Avail: NTIS HC A02/MF A01 CSCL 04/2

Measurements documenting the characteristics of naturally falling snow are being conducted to form a statistical base as input to the precipitation modeling efforts of the Cloud Physics Branch at AFGL (Air Force Geophysics Laboratory). The major part of the 1981-82 winter operations were held in conjunction with the CRREL sponsored, tri-service, SNOW-ONE-A field experiment at Camp Ethan Allen in Jericho, Vermont. This report summarizes the AFGL snow characterization measurements taken during SNOW-ONE-A. Three new instruments, designed and built to measure the fall velocities of individual snowflakes, the short-term variations in snowfall rates and to determine the crystalline structure of the prevailing snow, are described. Discussions are given on the overall operation of each instrument and examples of the resulting data are shown. Available results are listed in tabular form together with a preliminary data quality assessment. The initial analysis of the measurments taken during the storm of January 31, 1982 are also presented. GRA

N83-11669# New Mexico State Univ., Las Cruces. Physical Sciences Lab.

MODELS FOR BALLISTIC WIND MEASUREMENT ERROR ANALYSIS. VOLUME 1: MODEL FORMULATION Final Report

Arthur W. Dudenhoeffer White Sands Missile Range, N. Mex. Army Electronics Research and Development Command Jun. 1982 67 p refs
(Contract DAAD07-79-C-0008; DA Proj. 1L1-62111-AH-71)
(AD-A118016; ERADCOM/ASL-CR-82-0008-2) Avail: NTIS HC A04/MF A01 CSCL 04/2

Three models for ballistic wind measurement error analysis are discussed. These models, which were originally formulated by Donald M. Swingle, are named RAWIN, RADAR, and NAVAID. Each is applicable to a different type of meteorological acquisition system. RAWIN models the case of a balloon-borne radiosonde and ground-based set for radiodirection finding and telemetry data reception. RADAR models the case in which a ground-based radar set tracks an ascending balloon. NAVAID models the case in which radionavigation techniques are used to determine radiosonde position. Expressions for the variance in the East and North components of ballistic wind are obtained in terms of bias and random measurement errors and other parameters. Also, an average error quantity called the component velocity variance is defined. In Volume I each model is described, and the necessary computational expressions are derived. In Volume II the utilization of the associated computer programs on the UNIVAC 1108 at White Sands Missile Range is described. Author (GRA)

N83-11670# Weather Squadron (26th), Carswell AFB, Tex. Detachment 22.

TERMINAL FORECAST REFERENCE NOTEBOOK

May 1982 43 p
(AD-A118009) Avail: NTIS HC A03/MF A01 CSCL 04/2

The topography of the area and its effects are described. Air pollution and climate are also considered. Seasonal weather patterns and forecasting are also discussed. S.L.

N83-11671# National Oceanic and Atmospheric Administration, Washington, D. C. National Earth Satellite Service.

OBSERVATIONS OF HURRICANE DAVID (1979) USING THE MICROWAVE SOUNDING UNIT

Norman C. Grody and William C. Shen Apr. 1982 61 p refs
(PB82-215427; NOAA-82043004; NOOA-TR-NESS-88) Avail: NTIS HC A04/MF A01 CSCL 04B

Microwave measurements obtained for Hurricane David at four 12-hour intervals are reported. Comparisons are made between the brightness temperature measurements for the three highest frequency channels and the values computed from radiosonde data. Comparisons are also made between the radial derivative of brightness temperature for the $4.96-Giz channel and the derivatives estimated using radiosonde winds. Measurements and simulations demonstrate that the brightness temperature is correlated with the winds between 700 and 800 mb. Horizontal smoothing resulting from the instrument's 110-km resolution degrades the gradient information near the hurricane center more than the spot measurements of brightness temperature.
Author (GRA)

N83-11672# Illinois State Water Survey, Champaign.

THE ASESSMENT OF STATISTICAL PHYSICAL TECNIQUES FOR THE EVALUATION OF WEATHER MODIFICATION OPERATIONS. OSET REPORT, VOLUME 3 Final Report

Chin-Fei Hsu, Stanley A. Changnon, Jr., and Floyd A. Huff Oct. 1981 146 p refs
(Grants NSF ATM-79-05007; NSF ENV-77-01103)
(PB82-213661; ISWS/CON-286/81) Avail: NTIS HC A07/MF A01 CSCL 04B

A collection of statistical-physical techniques to evaluate weather modification projects was compared primarily through extensive simulation testing of assumed weather modification effects superimposed upon natural precipitation distributions. Statistical power was the main index used in comparison. Five data sets from four areas, covering a broad range of weather regimes, were selected for simulation of rainfall enhancement and hail suppression experiments. A number of past seeding projects of the commercial type were selected for testing the statistical-physical techniques, including a large-scale hail suppression and rain enhancement project in Kansas, several smallscale rain enhancement projects in Illinois, and a long-term operational hail suppression project in the Texas Panhandle. The technique of principal component regression was examined in detail. Meteorological covariates were studied to a limited extent for their usefulness in aiding the evaluation. Relevant issues to the operational projects, including historical comparison, piggyback experiments, and operational criteria, were also investigated. Author (GRA)

N83-11673# Illinois State Water Survey, Champaign. Meteorology Section.

AN ANNOTATED BIBLIOGRAPHY ON THE EVALUATION AND STATISTICAL ISSUES OF WEATHER MODIFICATION Final Report

Chin-Fei Hsu and Stanley A. Changnon, Jr. Jun. 1981 97 p 2 Vol.
(Grants NSF ATM-79-05007; NSF ENV-77-01103)
(PB82-213653; ISWS/CON-265/81) Avail: NTIS HC A05/MF A01 CSCL 04B

An annotated bibliography lists publications dealing with the evaluation and design of weather modification. An author and a keyword index is included. A separate list of publications with extensive bibliographies on the subject of weather modification is also included. The major objectives of the seeding evaluation project are: the development of statistical-physical techniques for evaluating operational projects; the evaluation of operational projects to test the techniques; the planning of future operational projects, including the development of operational criteria; and the evaluation of the utilization of meteorological covariates. GRA

N83-11674# National Weather Service, Honolulu, Hawaii.

THE 1981 TROPICAL CYCLONES: CENTRAL PACIFIC

Andrew K. T. Chun Feb. 1982 13 p refs
(PB82-195306; NOAA-82930401; NOAA-TM-NWS-PR-25) Avail: NTIS HC A02/MF A01 CSCL 04B

Brief descriptions are given of Tropical Storm Greg (August 20-22, 1981) and Tropical Storm Jova (September 18-20, 1981)

which took place in the Central Pacific. Verification statistics show that the 24-hour Central Pacific Hurricane Center (CPHC) forecast and forecasts from the EPHC77, EPAMLG, and EPCLPR models were verified. GRA

N83-11675# National Oceanic and Atmospheric Administration, Washington, D. C. Office of Federal Coordinator for Meteorological Services and Supporting Research.
NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN
Jan. 1982 49 p
(PB82-195017; NOAA-82030801; FCM-P11-1982) Avail: NTIS HC A03/MF A01 CSCL 04B

The responsibilities of the various United States agencies which provide meteorological services in observing and forecasting severe local storms are outlined. This plan incorporates changes recommended by the concerned agencies through the Subcommittee for Basic Services (SC/BS) working group on severe local storms. The following topics are discussed: (1) responsibilities of cooperating agencies; (2) definitions; (3) forecast and warnings; (4) communications; (5) observations; and (6) publicity.
Author (GRA)

N83-11676# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A FIXED DELAY, FREQUENCY-SHIFTED MICHELSON INTERFEROMETER FOR REMOTE AIR TEMPERATURE MEASUREMENT
Lawrence Alan Johnson Jan. 1982 153 p refs
(PB82-194846; NOAA-82030402; NOAA-TM-ERL-WPL-89) Avail: NTIS HC A08/MF A01 CSCL 04B

A fixed delay Michelson interferometer minimizes both pressure dependent changes in the spectral profile of the scattered radiation and the inherently low received signal levels by: (1) exhibiting a low sensitivity to pressure induced changes in the scattered spectrum and (2) optimally utilizing the available signal. By frequency shifting the signal in one arm of the interferometer relative to the other it is possible to efficiently modulate the output of the interferometer and make it insensitive to small changes in the center frequency of the scattered spectrum. A fixed delay, frequency shifted Michelson interferometer demonstrate, the ability of the instrument to remotely measure air temperatures in the range 290 K to 310 K at a received signal level of 6 x 10 to the minus tenth power watts. GRA

N83-11677# National Weather Service, Silver Spring, Md. Data Systems Div.
GUIDE TO AMOS, RAMOS, AND AUTOB OBSERVATIONS
Jun. 1981 52 p
(PB82-194788; NOAA-82031104) Avail: NTIS HC A04/MF A01 CSCL 04B

The Automatic meteorological observing system (AMOS), remote automatic meteorological observing system (RAMOS), and automatic observing station (AUTOB) and the techniques employed in meteorological data acquisition and formulation, and the station locations and vital statistics are outlined. The AMOS consists of an array of field sensors hardwired to a central processor. It transmits a weather report whenever the station is polled by the circuit. The AUTOB is an AMOS station which also automatically report sky condition, visibility, and precipitation. The RAMOS consists of an array of sensors, a processor, and a communications device. The system transmits its message whenever it receives its identifier using any one of four different modes: telephone, VHF-radio, satellite, or MED. The operation of the RAMOS depends on the type of communication used. GRA

N83-11678# National Climate Program Office, Washington, D.C.
BUDGET REQUESTS, RECOMMENDATIONS AND GOALS OF THE NATIONAL CLIMATE PROGRAM FOR FISCAL YEAR 1980 Annual Report
1981 65 p refs
(PB82-193939; NOAA-82032209) Avail: NTIS HC A04/MF A01 CSCL 04B

A statement of significant achievements during fiscal year 1980 for the National Climate Program is given. An evaluation of progress toward the goals of the program, and summary of the FY 1982 budget requests by involved federal agencies, and recommendations for additional legislation needed to ensure achievement of the goals of the program are given. The first five-year plan emphasizes use of current knowledge to develop and disseminate climate information and also expansion of understanding of climate and its effects of society. Author (GRA)

N83-11679# National Hurricane Research Lab., Miami, Fla. Environmental Research Labs.
NATIONAL HURRICANE RESEARCH LABORATORY FISCAL YEAR 1981 PROGRAMS: FISCAL YEAR 1982 PROJECTIONS
Jan. 1982 70 p refs
(PB82-193244; NOAA-82022206) Avail: NTIS HC A04/MF A01 CSCL 04B

The research on hurricanes and tropical meteorology to improve hurricane forecasting and to modify these storms is reported. The research activities include: hurricane prediction; hurricane structure and dynamics; hurricane boundary layer and air sea interactions; hurricane modeling; and tropical meteorology. GRA

N83-11680# National Weather Service, Honolulu, Hawaii.
RELATIONSHIP OF MAXIMUM SUSTAINED WINDS TO MINIMUM SEA LEVEL PRESSURE IN CENTRAL NORTH PACIFIC TROPICAL CYCLONES
Hans E. Rosendal and Samuel L. Shaw Feb. 1982 24 p refs
(PB82-193160; NOAA-82022201; NOAA-TM-PR-24) Avail: NTIS HC A02/MF A01 CSCL 04B

The relationship between the values of the central pressure of a tropical cyclone and its simultaneously observed maximum sustained winds were examined. The relationships are based on the pressure difference between the center and the peripheral environment of the cyclone. This peripheral pressure is higher in the central North Pacific area, which resides in stronger winds with CPHC cyclones than with cyclones in the Atlantic or western North Pacific with the same central pressures. A linear curve with good fit over the entire range of cyclone intensities was produced by regression analysis. Since hurricane winds in the central core of the cyclone are cyclostrophic and therefore related to the square root of the pressure gradient, such a relationship was developed. The relationships are used to construct a table and graph of central pressure versus maximum sustained wind speed estimates from observed values of central pressure. GRA

N83-11681# National Weather Service, Salt Lake City, Utah. Western Region Headquarters.
ARAP TEST RESULTS
Mark A. Mathewson Dec. 1981 24 p
(PB82-193103; NOAA-82020201; NOAA-TM-NWS-WR-174) Avail: NTIS HC A02/MF A01 CSCL 04B

The possibility to provide realtime radar information on AFOS for under $10,000 was determined. It was decided to build a more versatile radar processor and the RADAP system development is progressing. It is felt that a system can be developed for less money with only the bare essentials. It is found that there is a need for an inexpensive automated radar processor for use in both emergency (flash flood) and routine (pilot briefing) operations. Details of the ARAP Systems test are presented. GRA

N83-11682# National Science Foundation, Washington, D.C. Div. of Atmospheric Science.
COMPUTER TECHNIQUES AND METEOROLOGICAL DATA APPLIED TO PROBLEMS OF AGRICULTURE AND FORESTRY: A WORKSHOP Final Report, 15 Mar. 1981 - 31 Aug. 1982
Albert Weiss, ed. (Nebraska Univ.) Jan. 1982 394 p refs Workshop held in Anaheim, Calif., 30 - 31 Mar. 1981
(Grant NSF ATM-80-20422)
(PB82-192436) Avail: NTIS HC A17/MF A01 CSCL 04B

The developments in information technology were examined. Three main areas were investigated: methods of obtaining weather data, methods of changing data into weather related information for agriculture and forestry, and methods of disseminating this

information. The first area included automated weather stations; their use, design philosophy and maintenance as well as discussions on standard sources of data. The second area was divided into three sessions: crop, liverstock and forest production systems. Current knowledges, computer simulations and areas for future research were discussed. Various types of information dissemination systems currently in use in Nebraska, Georgia, Kentucky, California and Florida are reviewed. The impact of the technologies on agricultural meteorology in developing countries is presented. GRA

N83-11683# National Weather Service, Salt Lake City, Utah. Scientific Services Div.
ARAP USER'S GUIDE
Mark A. Mathewson Jul. 1981 104 p
(PB82-196783; NOAA-82031501; NOAA-TM-NWS-WR-167) Avail: NTIS HC A06/MF A01 CSCL 04B

The AFOS radar processor (ARAP) is described and instructions for its use are provided. The system is designed to provide both local and remote users with high resolution, timely radar data that are normally not available by any other means. The ARAP computer system is a Data General NOVA 4/x computer with 64 KW memory, a floppy disk drive (315 KW capacity), and a Winchester disk (12.5 MB capacity). It contains a communications interface (universal line multiplexer) capable of full duplex asynchronous communications for four lines. A video terminal is used for the console device. The only specialized hardware is a radar interface board and the antenna controller interface. The operating system is Data General Mapped RDOS model 3556 and runs off the Winchester disk. The ARAP program is a multitasking, overlayed program written in both FORTRAN (40%) and ASSEMBLER (60%) languages. M.G.

N83-11684# National Severe Storms Lab., Norman, Okla.
THUNDERSTORMS: A SOCIAL, SCIENTIFIC, AND TECHNOLOGICAL DOCUMENTARY. VOLUME 1: THE THUNDERSTORM IN HUMAN AFFAIRS
Edwin Kessler, ed. Sep. 1981 217 p refs
(PB82-197336; NOAA-82032206-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 04B

A collection of studies is presented documenting the thunderstorm phenomenon in all its aspects including some of the social dimensions, particularly within the United States. Specific topics included are: thunderstorms in a social context; disaster by flood; tornadoes as represented by the tornado outbreak of 3-4 April 1974; thunderstorms in agriculture and in forest management; harmful effects of thunderstorms on agriculture; wind effects on buildings; thunderstorms and aviation; severe thunderstorms prediction, warning, and disaster preparedness programs of the National Weather Service; and organizations and major facilities for storm research in the United States. GRA

N83-11536*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VOLCANOES AND CLIMATE
Owen B. Toon *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 15-36 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

N83-11546*# National Meteorological Center, Washington, D.C. Climate Analysis Center.
DISTRIBUTION OF MOUNT ST. HELENS DUST INFERRED FROM SATELLITES AND METEOROLOGICAL DATA
James D. Laver *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 131-140 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

N83-11550*# Wisconsin Univ., Madison. Center for Climatic Research.
THE CLIMATIC EFFECT OF EXPLOSIVE VOLCANIC ACTIVITY: ANALYSIS OF THE HISTORICAL DATA
Reid A. Bryson and B. M. Goodman *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 191-202 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

N83-11551*# University of Western Washington, Bellingham. Office of the State Climatologist.
PROBLEMS IN THE CLIMATOLOGY OF THE 1980 MOUNT ST. HELENS ERUPTIONS
Howard J. Critchfield *In* NASA. Langley Research Center Atmospheric Effects and Potential Climatic Impact of the 1980 Eruptions of Mt. St. Helens Oct. 1982 p 203-209 refs (For primary document see N83-11534 02-42)
Avail: NTIS HC A13/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-11685# National Research Inst. for Oceanology, Stellenbosch (South Africa). Coastal Engineering and Hydraulics Div.
WAVE CONDITIONS AT ORANJEMUND. SUMMARY OF WAVE-RIDER DATA, MARCH 1978 TO APRIL 1980
J. Rossouw Jun. 1981 66 p ref
(CSIR-T/SEA-8106; ISBN-0-7988-1824-7) Avail: NTIS HC A04/MF A01

Wave data off Oranjemund have been collected intermittently since 1976 by the coastal engineering research team of Consolidated Diamond Mines of South West Diamonds (CDM). Data were recorded by waverider buoy, initially located in 17 m water some 8 km north from Oranjemund (Fig. 1), from 25 March 1976 to 24 May 1976 and again from 19 August 1976 to 21 February 1977. During this period 20 minute records were obtained every three hours. The buoy was later relocated, in a water depth of 15 m, some 8 km N of the above position and further wave data were collected from 11 February 1978 to 12 April 1978, 6 June 1978 to 2 July 1978 and 12 April 1979 to 22 April 1980. From February to April 1978, 20 minute records were collected at 09h00, 12h00, 15h00 and 18h00 GMT every day. Since June 1978, 20 minute records were collected every six hours at 00h00, 06h00, 12h00 and 18h00 GMT every day. Author

N83-11686# National Research Inst. for Oceanology, Stellenbosch (South Africa). Coastal Engineering and Hydraulics Div.
MODEL STUDY ON WAVE ABSORBERS FOR APPLICATION IN HARBOURS ALONG THE SOUTH AFRICAN COASTLINE
D. J. P. Scholtz Sep. 1981 128 p refs
(CSIR-T/SEA-8114; ISBN-0-7988-1852-2) Avail: NTIS HC A07/MF A01

Wave absorber performance in harbors was studied in view of the need for wave absorbers that would function efficiently under wave conditions along the South African coastline. The reflection of short steep incoming waves can be reduced relatively easily to less than 50 per cent, but problems remain with long period waves of low steepness which cannot easily be damped and which, unfortunately, are dominant in South African harbors. Basically, two types of wave-absorbing structures are being used, namely, (1) the slope type which can be either impermeable or permeable, and (2) the vertical face type which is constructed of perforated caissons with hollow interiors or of specially designed hollow blocks. Model tests were done on rubble slopes, dolos slopes, discontinuous composite rubble slopes, patented absorber blocks and a column wave absorber. Generally it was found that the reflection coefficients were high when the relative depth (3) was low, and vice versa, and that the wave steepness had an insignificant effect on the reflection coefficient in the Hi/L range 0,004 to 0,024. S.L.

N83-11687# National Research Inst. for Oceanology, Stellenbosch (South Africa). Physical Oceanography Div.
PHYSICAL OCEANOGRAPHY IN SOUTH AFRICA
Eckart H. Schumann Oct. 1981 24 p
(CSIR-T/SEA-8116; ISBN-0-7988-2182-5) Avail: NTIS HC A02/MF A01

The activities of a research institute for oceanography are described. Areas of investigation include fisheries, upwelling, topology and remote sensing. R.J.F.

N83-11688# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Acoustics Div.
VOLUME REVERBERATION MEASUREMENTS IN THE EASTERN CARIBBEAN SEA Final Report
Coleman Levenson, Richard A. Love, Marcia A. Wilson, and Robert A. Fisher Nov. 1981 26 p refs
(AD-A118165; NORDA-TN-128) Avail: NTIS HC A03/MF A01 CSCL 20/1

Volume reverberation measurements were made utilizing explosive sources and an omnidirectional receiver in the Caribbean Sea along the Aves Ridge during June 1974 and February through March 1977. This report presents results of those measurements in the form of scattering strength profiles and column strengths for one-third octave bands. Comparisons are made between the two sets of data and previous data taken in the same area. Discrete biological net tows at one station are also compared to peak scattering depths. GRA

N83-11689# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Acoustic Simulation Branch.
ENVIRONMENTAL DATA BASE DEVELOPMENT AND ACOUSTIC MODEL SURVEY OF THE SOUTH ATLANTIC Final Report
James A. Davis, David B. King, Edward A. Estalote, George A. Kerr, and Burlie A. Brunson Mar. 1982 64 p refs
(AD-A118167; NORDA-TN-126) Avail: NTIS HC A04/MF A01 CSCL 08/10

A numerical model and data base study was designed to install an environmental data base for the South Atlantic Ocean and for use in conducting a limited scope acoustic transmission loss and ambient noise model study. The data base framework has been installed and tested. The model study has been conducted and several tentative conclusions have been reached regarding the acoustic nature of the South Atlantic. The limited adequacy of the current data base to provide accurate predictions of the acoustic sensitivity of the region is discussed. Recommendations for data base and model improvements are provided with an eye toward modeling support of future exercise planning in the region. Author (GRA)

N83-11690# Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
CLASSIFICATION OF COASTAL SEDIMENTS Final Report, 1980 - 1981
Joseph N. Suhayda and Mehet Tumay Mar. 1982 447 p refs
(Contract N00014-80-C-0846)
(AD-A118157) Avail: NTIS HC A19/MF A01 CSCL 08/10

This report presents the results of measurements of geotechnical properties of coastal sediments and penetration depths of cylinders into sediments in support of Buried Mine Minehunting System (BURMMS). Penetration into sediments was found to be described with a formula using the penetrometer mass, diameter and impact velocity, and the depth of penetration and shear strength of the sediment. The formula allows depth of penetration to be used to classify coastal sediments. Shear modulus of muds were found and related to shear strength. Author (GRA)

N83-11691# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
THEORY AND CALCULATION OF THE NONLINEAR ENERGY TRANSFER BETWEEN SEA WAVES IN DEEP WATER Final Report
Barbara A. Tracy and Donald T. Resio May 1982 54 p refs
(AD-A117989; WIS-11) Avail: NTIS HC A04/MF A01 CSCL 12/1

A procedure to integrate the energy transfer Boltzmann integrals has been set up by Webb using Hasselmann's theoretical development for the nonlinear wave-wave interactions between sea waves. This report discusses how the integration process has been made simpler and more efficient by the utilization of a geometrically spaced polar grid over the spectral region. This grid allows the loci and the coefficients inside the integrand to scale by various multiples of the geometric scaling factor. Numerical results for the nonlinear energy transfer are given for various spectra. Author (GRA)

N83-11692# Underwater Systems, Inc., Rockville, Md.
ANALYSES OF OCEANIC SUBSURFACE FEATURES USING SPACE BASED RADAR IMAGERY Final Report
Samuel Walter McCandless and Charmaine P. Mrazek Jul. 1982 204 p refs
(Contract N00014-82-C-0114)
(AD-A118411) Avail: NTIS HC A10/MF A01 CSCL 08/10

Bathymetric features are visible on some SEASAT SAR and SIR-A images. This study surveyed as wide a data base as possible and collected available ground truth to determine the limits of this visibility. Such parameters as tidal levels, currents, wind, rain, radar incidence angle, radar aspect angle and radar processing were all considered. Some dependence of visibility on current was discovered, and conversely, independence of radar incidence angle. The results were severely limited by the lack of detailed ground truth of an appropriate nature. Author (GRA)

N83-11693# Delaware Univ., Newark. Dept. of Civil Engineering.
SURF ZONE PROPERTIES AND ON/OFFSHORE SEDIMENT TRANSPORT
Wei-Chong Yang and Hsiang Wang Jun. 1982 219 p refs
(Contract N00014-81-K-0297)
(AD-A118442; CE-82-25; TR-12) Avail: NTIS HC A10/MF A01 CSCL 08/8

The surf zone properties and the on/offshore sediment transport rate were studied. A nondimensional surf zone parameter was obtained by taking the ratio of natural swash period to wave period. This parameter, in addition to its wide application in describing the breaker types, was pertinent to describing the flow patterns in surf zone and defining the region of validity of the similarity solutions. A similarity model was applied to describe the flow field of breaking waves in surf zone. Laboratory results from other investigators and those obtained in the present study were used to test the validity of the proposed model. Author (GRA)

N83-11694# Washington Univ., Seattle. Applied Physics Lab.
ARCTIC OCEANOGRAPHIC MEASUREMENTS, 1978 - 1980
G. R. Garrison, J. T. Shaw, and M. L. Welch Jun. 1982 106 p refs
(Contracts N00123-77-C-1013; N00024-81-C-6042)
(AD-A117936; APL-UW-8112) Avail: NTIS HC A06/MF A01 CSCL 08/3

The field measurements during three arctic expeditions are summarized. In 1978 a research station was established on the ice in the central Chukchi Sea and measurements of temperature, salinity, and current were taken in the water column. In 1979 a station was established on the ice in Kane Basin, north of Thule, Greenland, and temperature and salinity profiles were obtained. Ice temperature was monitored at several depths near the camp. GRA

N83-11695# National Oceanic and Atmospheric Administration, Seattle, Wash. Environmental Research Labs.
EDDIES DETACHED FROM A JET CROSSING OVER A SUBMARINE RIDGE USING A SIMPLE NUMERICAL MODEL
Motoyoshi Ikeda Dec. 1981 44 p refs
(PB82-217563; NOAA-TM-ERL-PMEL-33; NOAA-82042902; NOAA-PMEL-Contrib-521) Avail: NTIS HC A03/MF A01 CSCL 08J

An eastward flowing jet crossing over a submarine ridge was studied by using a two layer quasigeostrophic model. The jet initially has small amplitude meanders of t = o. The meanders grow propagating eastward, and the lower layer begins to move and feel bottom topography. The ridge influences meanders and eddies that are detached from large amplitude meanders. Detached, cyclonic eddies are strengthened south of the jet on the western slope of the ridge, as are anticyclonic eddies north of the jet on the eastern slope, because of vorticity generated by the topographic effects on the westward flows associated with two recirculating gyres which form on the north and south of the jet. Some of the eddies approach and coalesce with the jet which results in the jet splits into two branches surrounding the cyclonic eddy. The two recirculating gyres are divided by the ridge and have shorter zonal length than do those in the no ridge case. These specific flow patterns are observed in the Gulf Stream in the vicinity of the New England Seamount Chain and the Kuroshio over the Shatsky Rise. GRA

N83-11696# National Academy of Sciences - National Research Council, Washington, D. C. Ocean Policy Committee.
UNITED STATES INTERESTS AND NEEDS IN THE COORDINATION OF INTERNATIONAL OCEANOGRAPHIC RESEARCH Final Report
Edward L. Miles, Lewis Alexander, William T. Burke, John V. Byrne, Ann L. Hollick, Feenan D. Jennings, and Lauriston R. King Apr. 1982 129 p refs Presented at Workshop, Corvallis, Oregon, 10-12 Sep. 1979 Sponsored by NSF
(PB82-209792) Avail: NTIS HC A07/MF A01 CSCL 08J

Discussions at a workshop held at the Oregon State University Marine Science Center, September 10-12, 1979, in Newport, Oregon are presented. The meeting concerned projected needs for cooperation in international oceanographic research, organizational arrangements and procedures to facilitate and coordinate U.S. marine research in foreign waters, and the impact of changes in the international legal regime governing use of the oceans. Author

N83-11697# National Weather Service, Anchorage, Alaska.
A CLIMATOLOGY OF THE ICE EXTENT IN THE BERING SEA
Bruce D. Webster Jul. 1981 45 p refs
(PB82-193038; NOAA-82022501; NOAA-NWS-AR-33) Avail: NTIS HC A03/MF A01 CSCL 08L

A climatology of the ice limit and 50% concentration boundary in the Bering Sea is graphically formatted in terms of probabilities (in percent) of the ice extent. They are contoured in 25% increments from zero to 100% with the zero, 50 and 100% isopleths depicting the absolute maximum, median and absolute minimum ice extent, respectively. The purpose for this approach is to provide a basis for predicting the ice in the long range which may be of some benefit in the seasonal planning of marine operations in the Bering Sea. Author (GRA)

N83-11698# North Carolina State Univ., Raleigh. Dept. of Marine, Earth and Atmospheric Sciences.
ESTIMATION OF SURFACE GRAVITY WAVES FROM SUBSURFACE PRESSURE RECORDS FOR ESTUARINE BASINS
C. Ernest Knowles Sep. 1981 25 p refs
(Contract NA79AA-D-00048)
(PB82-194747; NOAA-82030405; UNC-SG-WP-81-6) Avail: NTIS HC A02/MF A01 CSCL 08C

According to small-amplitude theory, the surface gravity-wave energy spectrum can be estimated from a subsurface pressure-fluctuation spectrum by applying a factor K that compensates for the attenuation of surface-wave amplitude as the depth below the water surface and the wave frequency increase. There are a number of linear and nonlinear environmental factors, however, that cause K to be invalid over most of the spectrums frequency range. Some of the reasons why the empirical factors vary so greatly are discussed. Grace; equation for n as a function of the nondimensional frequency parameter kh is recommended specifically for use in an estuarine environment. The maximum limit (K sub m) on the magnitude of K, where relative depth d/h were the independent variables, is evaluated. Author (GRA)

N83-11699# Indian Inst. of Tech., Madras. Ocean Engineering Centre.
PROCEEDINGS OF THE FIRST INDIAN CONFERENCE IN OCEAN ENGINEERING, VOLUME 1
Feb. 1981 595 p refs Presented at Madras, 18-20 Feb. 1981 2 Vol.
(PB82-200296) Avail: NTIS HC A25/MF A01 CSCL 08C

Papers were presented on waves, currents, environmental loads; analysis and design of ocean structures; marine geotechniques; construction towing; launching and installation of offshore structures; behavior of materials; ocean energy; underwater instrumentation and communication; and marine pollution. Author

N83-11700# Indian Inst. of Tech., Madras. Ocean Engineering Centre.
PROCEEDINGS OF THE FIRST INDIAN CONFERENCE IN OCEAN ENGINEERING, VOLUME 2
Feb. 1981 187 p refs Presented at Madras, 18-20 Feb., 1981 2 Vol.
(PB82-200304) Avail: NTIS HC A09/MF A01 CSCL 08C

Offshore structures, wave energy, soil-structure interaction, and an oceanographic instrument package are discussed. N.W.

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-11701# Council for Scientific and Industrial Research, Pretoria (South Africa).
SOUTH AFRICAN ANTARCTIC BIOLOGICAL RESEARCH PROGRAMME
Jul. 1981 65 p refs
(Rept-50; ISBN-0-7988-2128-0) Avail: NTIS HC A04/MF A01

Biological research activities in the sub-Antarctic and Antarctic regions are described. Paleo-ecological and biogeographical studies, ecosystem studies, autecological studies, studies on alien biota, and monitoring studies comprise the research program. Author

N83-11702*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL OPERATIONS AND LIFE SCIENCES ACTIVITIES ON SPACE STATION
Philip C. Johnson, ed. and John A. Mason, ed. Oct. 1982 47 p (NASA-TM-58248; S-518; NAS 1.15:58248) Avail: NTIS HC A03/MF A01 CSCL 05H

Space station health maintenance facilities, habitability, personnel, and research in the medical sciences and in biology are discussed. It is assumed that the space station structure will consist of several modules, each being consistent with Orbiter payload bay limits in size, weight, and center of gravity. Author

N83-11703# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
THE POSSIBLE ROLE OF CATECHOLAMINES IN THE PROTECTIVE EFFECT OF GENERAL ANESTHETICS AGAINST KIDNEY LESIONS IN RATS SUBJECTED TO HEMORRHAGIC HYPOTENSION
C. VanderMeer, W. C. M. Cramer, J. A. M. Versluys-Broers, P. W. Valkenburg, and P. M. Snijders Dec. 1981 14 p refs Prepared in cooperation with Amsterdam Univ.
(Contract A76/K/095)
(MBL-1981-16; TDCK-76175) Avail: NTIS HC A02/MF A01

Dibenamine, 15 mg/kg, injected in rats anesthetized with ketamine, 60 min before bleeding for 60 min aginst 40 mm Hg, significantly reduced the severity of kidney lesions. The maximum bleeding volume was reduced by 14%. Adrenalectomy also reduced the bleeding volume but all animals died within 24 hr. In unanesthetized rats bled against 40 mm Hg, plasma adrenaline and nor-

adrenaline rose approximately tenfold as compared with unbled animals. It is concluded that vasoconstriction due to the release of catecholamines is an important factor in the generation of kidney lesions during hypotension in rats and that the protective effect of a number of general anesthetics largely depends on their ability to suppress the release of catecholamines. Author (ESA)

N83-11704# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
DISTURBANCES IN THE GLUCOSE METABOLISMIN INTESTINAL ISCHEMIA SHOCK
C. vanderMeer, P. W. Valkenburg, and J. A. M. Versluys-Broers Dec. 1981 22 p refs Prepared in cooperation with Amsterdam Univ.
(Contract A76/K/095)
(MBL-1981-17; TDCK-76176) Avail: NTIS HC A02/MF A01

Intestinal ischemia shock was obtained in fasted rats by 40-minute splanchnic arterial occlusion or by 35-minute portal vein occlusion (PVO). Survival was prolonged by plasma treatment; further prolongation was obtained by additional administration of glucose. Surgical treatment is described. It is concluded that the sympathetic nervous system is stimulated by a substance, possibly related to VIP, released from the intestines. After PVO hyperglycemia is less marked. Plasma adrenalin as well as insulin are increased. During late and fatal hypoglycemia after PVO plus plasma treatment, the liver still appears to be functionally intact. It is assumed that gluconeogenesis is reversibly inhibited by as yet unknown factors. The hypoglycemia cannot be abolished by injection of common substrates of gluconeogenesis, but the combination fructose plus glucagon plus NAD is highly effective. Author (ESA)

N83-11705# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
THE EFFECT OF ATP ON SURVIVAL IN INTESTINAL ISCHEMIA SHOCK, HEMORRHAGIC SHOCK, AND ENDOTOXIN SHOCK IN RATS
C. vanderMeer, P. M. Snijders, and P. W. Valkenburg Jan. 1982 23 p refs Prepared in cooperation with Amsterdam Univ.
(Contract A76/K/095)
(MBL-1982-1; TDCK-76177) Avail: NTIS HC A02/MF A01

A dose of Mg-ATP (72 micro/mole/kg) was injected into anesthetized rats, subjected to intestinal ischemia shock, hemorrhagic shock, or endotoxin shock, shock models in which all untreated animals died. Administration of Mg-ATP in no instance improved survival rate. It is concluded that any beneficial effect of ATP is probably small while the occurrence of adverse effects cannot be neglected. Author (ESA)

N83-11706# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
BEHAVIORAL EFFECTS IN THE RAT OF A SINGLE ADMINISTRATION OF TRIMETHYLTIN
O. L. Wolthuis Mar. 1982 34 p refs
(MBL-1982-2; TDCK-76388) Avail: NTIS HC A03/MF A01

The behavioral sequelae, following a single oral administration of 5 or 10 mg/kg trimethyltin (TMT), were investigated in rats in two procedurally almost identical experiments. Repeated measurements of open field behavior during 6 weeks were followed by active avoidance in a two-way shuttle box and passive avoidance testing in a light-dark discrimination test. An attempt is made to explain the monophasic effects of 5 mg/kg and the biphasic effects of 10 mg/kg TMT. It is assumed that at lower brain-levels of TMT, after 5 mg/kg or during the early wash-in phase after 10 mg/kg, this chemical has a stimulating effect on the amygdaloid complex and the hippocampus which causes aggressive behavior and behavioral inhibition, respectively. At the 10 mg/kg level, this stimulation phase is followed by neuronal death; aggressive behavior subsides and hippocampal response-breaking mechanisms are lost. The behavioral pattern that emerges closely resembles that of hyppocampectomized rats. Author (ESA)

N83-11707# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 23
25 Oct. 1982 137 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82060) Copyright. Avail: NTIS HC A07

Progress in Soviet research in the areas of life science, biomedical sciences, and behavioral sciences is reported. Topics discussed include: biology, biotechnology, epidemiology, genetics, laser effects, marine mammals, medical demography, medicine, microbiology, and physiology. For individual titles, see N83-11708 through N83-11714.

N83-11708# Joint Publications Research Service, Arlington, Va.
MOLECULAR MECHANISMS OF EFFECTS OF BOTULINUS AND TETANUS NEUROTOXINS **c32**
V. K. Lutsenko *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 1-20 refs Transl. into ENGLISH from Usp. Sovrem. Biol. (USSR), v. 91, no. 1, Jan.-Feb. 1981 p 99-113 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

The physiochemical properties of toxin molecules, significance of different amino acids to toxicity and role of ganglio-sides in chemical reception of toxins are discussed. The distinctions of presynaptic effects on the central and peripheral synapses are analyzed. Effects of toxins on main processes involved in synaptic transmission are evaluated. E.A.K.

N83-11709# Joint Publications Research Service, Arlington, Va.
MODERN BIOTECHNOLOGY: FRONTIERS AND FUTURE
V. M. Zhdanov and T. I. Tikhonenko *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 21-25 Transl. into ENGLISH from Vopr. Virusol. (USSR), no. 3, May-Jun. 1982 p 4-7 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

Basic and applied scientific research, and science and industry which also involves the biological sciences are discussed. The microbioligical industry has emerged, biological catalysts are used extensively in industry, the achievements of genetics are recognized in breeding antibiotic producers and other useful microorganisms, biological methods are used extensively in the control of agricultural pests and many others. Further development in physiochemical biology and biotechnology and its advances in medicine, agriculture and industry, by the formation of a new scientific applied sector, biotechnology, which is the organic blend of technical biochemistry, microbiology, genetic engineering, combined with the use of animal and plant cell cultures and immobilized enzymes is discussed. Included are both age old processes and new technological processes developments in biology are outlined. The microbiological industry, contributes much to agriculture and public health like agricultural fertilizers, as well as antibiotics. E.A.K.

N83-11710# Joint Publications Research Service, Arlington, Va.
HELIUM-NEON LASER USED TO TREAT ANGINA PECTORIS **c52**
B. S. Agov, N. D. Devyatkov, A. Ye. Zhuk, N. S. Makeyeva, D. B. Tsykin, and N. N. Shastin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 40-42 refs Transl. into ENGLISH from Klin. Med. (USSR), v. 60, no. 5, May 1982 p 65-67 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

Therapeutic effect of red light helium and neon laser (HNL) in patients with angina pectoris was studied. Experimental and clinical data on the beneficial effects of red HNL on metabolic processes in tissues, circulation and mitotic activity are presented. It is shown that exposure of the skin over the region of the rat heart is instrumental in dilating blood vessels, not only of the skin and subcutaneous cellular tissue, but the myocardium. Use of red light HNL for treatment of patients with angina pectoris over ä 5 year period is reported. Indications and contraindications for laser therapy are elaboraed, and the effect of HNL red light on

parameters of peripheral blood, the EKG wre studied and the mechanism of HNL effect on angina pectoris is determined. E.A.K.

N83-11711# Joint Publications Research Service, Arlington, Va.
MEDICAL USES FOR LASERS **c52**
O. Semenova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 45-47 Transl. into ENGLISH from Leninskoye Znamya (USSR), 16 May 1982 p 4 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

Ultrasound for treatment of a number of occupational diseases was developed. Ultrasound has curative properties. It has become physiotherapeutic agent, and it is used in surgery. The effects of prolonged contact with ultrasonic equipment to health are examined. It is found that general by ultrasound is harmless in low doses and even beneficial. The very same ultrasound however, that treats could cause some diseases if there is prolonged and periodically repeated contact. The development of pain in operators' hands, heightened sensitivity of the skin to cold and vegetovascular syndromes, is attributed to ultrasound. E.A.K.

N83-11712# Joint Publications Research Service, Arlington, Va.
HELIUM-NEON LASERS IN TREATMENT OF PATIENTS WITH ODONTOGENIC INFLAMMATORY DISEASES **c52**
D. L. Korytnyy, T. K. Supiyev, and D. M. Artygaliyeva *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 48-51 refs Transl. into ENGLISH from Zdravookhr. Kaz. (USSR), no. 6, Jun. 1982 p 42-44 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

Treatment of acute suppurative and inflammatory diseases is to limit the spread of the infectious process. The clinical use of laser therapy, as a method for physiotherapy, is examined. Good results with the use of helium-neon lasers (HNL) in the treatment of a number of stomatological diseases in both adults and children are reported. The effects of laser therapy on aseptic staphylococcal infection in the region of the rabbit's mandible were studied and the possibility of using a combination of radiation with surfical intervention in the site of inflammation was determined. E.A.K.

N83-11713# Joint Publications Research Service, Arlington, Va.
ACCIDENTAL LASER INJURY TO FUNDUS OF BOTH EYES **c52**
V. M. Gayday and V. I. Filippenko *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 52-54 Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 5, May 1982 p 56-58 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

Laser application in different sectors of technology, science and medicine is broadened which has caused an increase in the range of specialists related to production, adjustment and operation. It is found that the biological effect of laser radiation on man affects primarily the eyes. It is shown that infractions of safety rules when working with lasers causes eye damage which varies in severity with partially reversible or irreversible loss of visual functions. The effect of laser beams on a biological system can cause thermal burn, coagulation of protein structures and even mechanical trauma. E.A.K.

N83-11714# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF HYPERBARIC OXYGENATION AT MEDICAL EVACUATION STAGES **c52**
S. B. Gatagov, A. A. Rafalskiy, and A. F. Litavrin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 66-71 Transl. into ENGLISH from Voyenno-Med. ZH. (USSR), no. 5, May 1982 p 16-19 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

The use of hyperbaric oxygen in the treatment of hypoxia was examined. Effective control of hypoxia which is of intrest to military physicians is discussed. Hypoxia frequently compilcates the pathology of combat trauma with wound infection, acute poisoning, damage to the respiratory tract by gunpowder fumes, toxic smoke and other highly toxic impurities. Acute hypoxia causes difficulties in the implementation of therapeutic and evacuation measures. Early use of hyperbaric oxygenation (HBO) at different stages of medical evacuation is necessary for prompt restoration of oxygenation of the body. It is shown that wide used of hyperbaric oxygen in the practice of medical institutions enables to shorten the period of patient treatment and avoid development of many dangerous complications. E.A.K.

N83-11715# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 8
25 Oct. 1982 80 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82061) Copyright. Avail: NTIS HC A05

The biological effects of nonionizing electromagnetic radiation are considered. For individual titles, see N83-11716 through N83-11724.

N83-11716# Joint Publications Research Service, Arlington, Va.
STANDARDIZATION OF PHYSICAL CONDITIONS FOR STUDYING BIOLOGICAL EFFECTS OF ELECTROMAGNETIC FIELDS
H. Pfutzner *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 1-3 refs Transl. into ENGLISH from Soobshch. Akad. Nauk Gruzinsk. (Tbilisi, USSR), v. 105, no. 1, Jan. 1982 p 145-148 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

Experimentation in the biological effects of electromagnetic fields is reviewed. Standardization of physical conditions is discussed. N.W.

N83-11717# Joint Publications Research Service, Arlington, Va.
CHANGES IN BLOOD CLOTTING SYSTEM AFTER SURGICAL INTERVENTION ON LUNGS WITH EXPOSURE TO STATIC MAGNETIC FIELD **c52**
Yu. A. Novikov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 4-7 refs Transl. into ENGLISH from Anesteziologiya i Reanimatologiya (Moscow), no. 3, May - Jun. 1982 p 21-23 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

Changes in blood coagulation and anticoagulation system as related to method of analgesia used, in the early postoperative period in patients who underwent lung surgery. The effect of static magnetic fields (SMF) on biological systems is discussed. Author

N83-11718# Joint Publications Research Service, Arlington, Va.
MAGNETOTHERAPY OF TRAUMA AND SOME DISEASES OF ATHLETES **c52**
I. S. Shepeleva, Yu. F. Kamenev, N. A. Demetskaya, Yu. V. Bogdanov, V. G. Slyusarenko, and K. Sh. Bekseitov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 8-11 refs Transl. into ENGLISH from Teoriya i Prakt. Fiz. Kultury (Moscow), no. 3, Mar. 1982 p 56-58 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

Physical methods play a rather important part among the diverse methods available to the system of rehabilitation of athletes with trauma and diseases of the skeletomuscular system. Use thereof reduces patient rehabilitation time and accelerates recovery of athletic work capacity. The choice and prescription of physical factors depend largely on conditions, under which athletes are rehabilitated after sustaining trauma. The possibilities of rehabilitation therapy are more favorable when there is a physiotherapy office and necessary specialists, and they are limited when the sports physician works at educational and training meets, where only portable physiotherapeutic equipment can be used. For this reason, the search for new and effective physical factors, use of which does not require cumbersome and complicated equipment, is one of the pressing problems of sports medicine in general and traumatology in particular. In this respect, magnetotherapy using a static magnetic field (SMF) is particularly promising according to data in the literature, it has anti-inflamation, analgesic

and vasodilating effects; it improves metabolic processes in tissues, normalizes regenerative processes and has a favorable psychological effect on patients. Author

N83-11719# Joint Publications Research Service, Arlington, Va.
ROLE OF GEOMAGNETIC FIELD IN ALTERATION OF ERYTHROCYTE SURFACE MEMBRANE PROPERTIES IN PATIENTS WITH CHRONIC, NONSPECIFIC LUNG DISEASES **c52**
V. P. Pyatkin and V. L. Semenov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 12-16 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 12-15 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

The influence of geomagnetic field (GMF) variations on the functional state of surface membranes of erythrocytes was investigated. N.W.

N83-11720# Joint Publications Research Service, Arlington, Va.
EFFECT OF STATIC MAGNETIC FIELD ON COMPRESSION OF CAROTID ARTERIES AND ASPHYXIA (EXPERIMENTAL STUDY) **c52**
S. V. Rutsay *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 17-20 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 15-18 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

The effect of preliminary and repeated exposure to a static magnetic field (SMF) on rat resistance to asphyxia and compression of the carotids. Since it is known that the central nervous system is highly sensitive to SMF. This effect was tested on the head of the animals. Brain function according to conditioned reflex activity was assessed. Author

N83-11721# Joint Publications Research Service, Arlington, Va.
USE OF SONIC RANGE MAGNETIC FIELDS IN TREATMENT OF SOME DISEASES **c52**
A. G. Kakuliya, L. A. Abuladze, L. G. Glonti, M. N. Melikishvili, and L. S. Urpanishvili *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 21-24 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 18-21 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

The efficacy of magnetic fields (MF) in the sonic range was tested on patients with arteriosclerosis obliterans of the lower extremities and osteoarthrosis deformans (OAD). The effect of a course of sonic-range MF was tested on the model of OAD in experiments on rabbits. Author

N83-11722# Joint Publications Research Service, Arlington, Va.
UNIT FOR EXPOSURE OF BIOLOGICAL OBJECTS TO STATIC MAGNETIC FIELD
M. S. Golinskaya and G. D. Kizlov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 37-39 Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 65-66 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

A simple device was developed which enabled us to localize the effect of static magnetic fields (SMF) to a specific region in a small laboratory animal. Two ferrite magnets, and conical concentrators of magnetic flux made of magnetically soft brand 341 steel were used. The concentrators of magnetic flux made of magnetically soft brand 341 steel were used. The concentrators were appropriately magnetized under the effect of the magnets' magnetic field and the required magnetic field was then generated in the space between them. The degree of magnetization of the concentrators and, consequently, induction of magnetic field between them was varied by introducing nonmagnetic (paper) liners of different thickness between the magnets and concentrators. Author

N83-11723# Joint Publications Research Service, Arlington, Va.
USE OF LASERS IN SURGERY **c52**
A. S. Kryuk, V. P. Kostyuk, V. P. Dolgolikov, N. S. Serdyuchenko, and Ye. F. Platkovskiy *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 51-56 refs Transl. into ENGLISH from Zdravookhraneniye Belorussii (Minsk), no. 4, Apr. 1982 p 52-54 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

The use of low-power lasers to stimulate repair processes in the case of trophic ulcers, consolidate fractures, and other applications is discussed. N.W.

N83-11724# Joint Publications Research Service, Arlington, Va.
NEW BOOK ON LASER TREATMENT OF WOUNDS **c52**
A. K. Polonskiy, Ye. I. Polishchuk, and V. A. Pavlov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 57-59 Transl. into ENGLISH from Klinich. Khirurgiya (Kiev), no. 2, Feb. 1982 p 58-59 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

The results of experimental studies and clinical use of lasers in the treatment of wounds are summarized. Author

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N83-11725# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE PROBLEM OF CREATING ARTIFICIAL BLOOD USING FLUOROCARBONS
V. S. Yarochkin and V. B. Koziner 1982 27 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 3, 1981 p 78-87
(NRC/CNR-TT-2032; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

Research toward the creation of a synthetic blood substitute using fluorocarbons is reviewed. N.W.

N83-11726*# National Aeronautics and Space Administration, Washington, D. C.
VOLUNTARY SODIUM INTAKE DURING EFFORT IN HOT ENVIRONMENTS
Ezra Sohar, Raphael Adar, and Abraham Hershco Sep. 1982 11 p refs Transl. into ENGLISH from Harefuah, J. of the Med. Assoc. of Israel, v. 60, no, 10, May 1961 p 334-337 Transl. by Kanner (Leo) Associates, Redwood City, California Original doc. prep. by Tel-Hashomer Government Hospital
(Grant NASw-3541)
(NASA-TM-76954; NAS 1.15:76954) Avail: NTIS HC A02/MF A01 CSCL 06P

The factors that influence the amount of salt that a person adds to his food at mealtime, and the part played by the general requirement for salt in the daily diet stemming from the coluntary input of salt are studied. Careful measurements of salt intake and outflow were performed on ten marchers in a high temperature environment who were given individual salt shakers that were weighed before and after each meal. Some marchers were told to add salt to their meals on specific days. No parallelity was found between the voluntary sodium intake and the general sodium intake, the excretion of sodium in the urine or the environmental heat stress. Individual food habit was found to be the most important factor. R.J.F.

N83-11727# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Environmental Quality Branch.
COMPARATIVE TOXICITY OF SELECTED AVIATION FUELS AS MEASURED BY INSECT BIOASSAY M.S. Thesis
David W. Bombick, Larry G. Arlian, and James M. Livingston Jul. 1982 55 p refs Prepared in cooperation with Wright State Univ. (AF Proj. 6302)
(AD-A118362; AFAMRL-TR-82-31) Avail: NTIS HC A04/MF A01

CSCL 06/20

The acute toxicity of JP-4, JP-8 and JP-9 fuels was evaluated for several terrestrial insects by contact exposure. JP-8 was the most toxic fuel to most of the insect species. Shale derived fuels were more toxic than their petroleum derived counterparts, however, species response varied with each type fuel. The order of decreasing susceptibility to pertroleum derived JP-4 was earwigs, rice weevils, flour beetles, lady beetles, tenebrionid beetles and cockroaches. GRA

N83-11728# Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.

HEALTH HAZARD EVALUATION OF LIQUID MONOPROPELLANTS. PHASE 2: EFFECTS OF DERMAL ADMINISTRATION OF HYDROXYLAMMONIUM NITRATE Report, May 1980 - Mar. 1982

Arthur Asaki Mar. 1982 26 p refs

(AD-A118415; USAEHA-75-51-0132-82) Avail: NTIS HC A03/MF A01 CSCL 06/20

Skin application of hydroxylammonium nitrate (HAN) to rabbits for 3 weeks induced a high incidence of chronic and ulcerative dermatitis in all treatment groups including the lowest dose tested, i.e., 0.7 mg/kg. Higher doses, 1.5 to 11.7 mg/kg, caused Heinz body formation and red blood cell destruction. It is recommended that extreme caution be taken to prevent HAN from coming into contact with the skin. Personal protection, to include rubber gloves and chemical splash goggles, should be worn when working with this material. Author (GRA)

N83-11729# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

ANALYSIS OF HEAD AND NECK DYNAMIC RESPONSE OF THE U.S. ADULT MILITARY POPULATION Annual Report, 1 Jul. 1981 - 30 Jun. 1982

B. M. Bowman and L. W. Schneider 27 Jul. 1982 39 p refs

(Contract N00014-81-K-0603; NR Proj. 207-280)

(AD-A118440; UM-HSRI-82-29; TR-1) Avail: NTIS HC A03/MF A01 CSCL 06/19

Human subject data collected in the program of impact acceleration tests being conducted at the Naval Biodynamics Laboratory were analyzed to investigate the relationships between dynamic head/neck response and biomechanical properties of the neck. Study of these data with head/neck motion simulation has yielded important information pertinent to eventual construction of improved anthropmorphic dummies and has helped to improve the predictive capabilities of mathematical models. Author (GRA)

N83-11730# Naval Ocean Systems Center, San Diego, Calif.

MECHANISM OF ELECTROMAGNETIC ENERGY EFFECTS OF THE NERVOUS SYSTEM. EXPERIMENTAL SYSTEM AND PRELIMINARY RESULTS Preliminary Report, Oct. 1979 - 16 Jun. 1979

N. L. Campbell and C. L. Brandt 1 Jul. 1982 68 p refs

(ZR0000101)

(AD-A117527; NOSC-TR-698) Avail: NTIS HC A04/MF A01 CSCL 06/18

Effects of high-level electromagnetic (EM) energy on living nerve tissue were assessed by subjecting individual nerve cells of the marine gastropod Aplysia californica to microwave radiation levels of 10-300 mW/sq cm . Of the 84 cells exposed, five showed inhibitory responses and one showed excitatory response that required from 6 to 82 minutes to develop. In each case, the cell returned to normal activity within 70 minutes of removing the EM field. It appears from the data collected that interaction of EM energy with the electrical activity of nerve cells does exist, and that this interaction is not heat-related. Understanding the mechanism of this interaction will provide a valuable tool in determining the hazards of nonionizing EM energy and the necessary safety limits of exposure. Author (GRA)

N83-11731# Army Aeromedical Research Lab., Fort Rucker, Ala.

OSCILLATIONS IN THE VISUAL RESPONSE TO PULSED STIMULI

Franklin F. Holly Jun. 1982 63 p refs

(DA Proj. 3E1-61102-BS-07; DA Proj. 3E1-62773-A-819)

(AD-A117428; USAARL-82-5) Avail: NTIS HC A04/MF A01 CSCL 05/10

Dunlap (1915) reported a phenomenon in which a single photic pulse, presented in the periphery under mesopic conditions, is perceived as two sequential flashes. The present work indicates that this double-flash effect is but a special case of a class of auto-oscillatory phenomena occurring at a frequency in the neighborhood of 10 Hz. Flicker studies by several investigators (e.g., de Lange, 1958) have indicated a resonance (temporal MTF peak) at approximately 10 Hz. It is believed that the frequency of the oscillatory phenomena described here results from the natural frequency of the network responsible for this peak. It is also believed that these phenomena are related to the oscillatory potentials which have been recorded from retina and cortex. The impetus for this work was provided by the need to explicate certain oscillatory phenomena which had been noted in the course of evaluating proposed lighting systems on new Army helicopters. Author (GRA)

N83-11732# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

TOXICOLOGY OF 1.2 DICHLOROETHANE

D. M. W. Elskamp Nov. 1981 26 p refs In DUTCH; ENGLISH summary

(MBL-1981-13; TDCK-76173) Avail: NTIS HC A03/MF A01

The results of a search of the literature for the toxic characteristics of 1,2 dichloroethane are presented. Technical data, environmental and biological monitoring, toxicokinetics and data of acute and chronic toxicity for laboratory animals and humans are dealt with. The effects on reproduction and mutagenic and carcinogenic effects are discussed: the available data show tha dichloroethane can only be slightly suspected. Author (ESA)

N83-11733# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

TOXICOLOGY OF 1.1-DICHLOROETHANE

D. M. W. Elskamp Nov. 1981 10 p refs In DUTCH; ENGLISH summary

(MBL-1981-14; TDCK-76174) Avail: NTIS HC A02/MF A01

The results of a search of the literature for the toxic characteristics of 1,1 dichloroethane are presented. Technical data, environmental and biological monitoring, toxicokinetics, and data of acute and chronic toxicity for laboratory animals and humans are dealt with. The effects on reproduction as well as mutagenic and carcinogenic effects are discussed. Author (ESA)

N83-11734# Institute of Applied Physiology and Medicine, Seattle, Wash.

INVASIVE BLOOD FLOWMETERS Final Report, 15 May 1973 - 15 Jun. 1974

J. M. Reid 20 Jan. 1982 41 p refs

(Contract NO1-HV-3-2994)

(PB82-190851; NO1-HV-2994-1) Avail: NTIS HC A03/MF A01 CSCL 06L

Catheter mounted ultrasonic Doppler blood flowmeters capable of measuring the volume flow of blood in small diameter vessels were explored. It is suggested that the instrument could be passed through the center of conventional catheters to obtain additional information from the examination. Ultrasonic Doppler electronics packages were tested for operation with the catheters. System testing for stability and accuracy showed that the basic calibration was feasible and measurements could be taken which were independent of the sensitivity of the catheters and of the electronics system. It is shown that the sources of interference and noise can be eliminated and that the catheter is a useful tool as a flow and aeroembolism monitor in animals. GRA

N83-11735# National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Bureau of Occupational Safety and Health.

A FOLLOW-UP SURVEY OF LASER INJURIES IN THE STATES OF CALIFORNIA, MASSACHUSETTS, AND NEW JERSEY

one died. Skin burns from laser beam impact were diagnosed. Aspects of laser safety, case histories of affected workers, and methods of injury prevention are reviewed. GRA

N83-11736# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Vision.
PROCEDURES FOR TESTING COLOR VISION Final Report
Dec. 1981 131 p refs
(Contract N0014-80-C-0159)
(PB82-209693) Avail: NTIS HC A07/MF A01 CSCL 06P

Information on color vision tests was assembled. The administration, scoring, and interpretations of these color vision tests are described and studies of the validation of each test is evaluated. Additional material is included to make a self-contained reference source on procedures for testing color vision. Characterization of color vision and the classification of color vision defects are described. Recommendations are made for the appropriate use of color vision tests in occupational screening. GRA

N83-11737# Institute of Applied Physiology and Medicine, Seattle, Wash.
ULTRASONIC IMAGING DEVELOPMENT Annual Report, Sep. 1977 - Jun. 1978
John M. Reid Mar. 1982 41 p refs
(Contract NO1-HV-2926)
(PB82-215518; NO1-HV-2926-1) Avail: NTIS HC A03/MF A01 CSCL 06A

Producing a continuous-wave Doppler arterial imaging system for the detection and quantitation of atherosclerosis was investigated. An automatic line scanning system, a new pulse-Doppler system for producing biplane images of the carotid bifurcation and a physiological interpretive display for presenting data in the form of a color map are discussed. Author (GRA)

N83-11392# Twente Univ. of Technology, Enschede (Netherlands). Dept. of Electrical Engineering.
THE HUMAN VISUAL SYSTEM
D. Bosman *In* AGARD Image Process. Tech. May 1982 22 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

N83-11710# Joint Publications Research Service, Arlington, Va.
HELIUM-NEON LASER USED TO TREAT ANGINA PECTORIS
B. S. Agov, N. D. Devyatkov, A. Ye. Zhuk, N. S. Makeyeva, D. B. Tsykin, and N. N. Shastin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 40-42 refs Transl. into ENGLISH from Klin. Med. (USSR), v. 60, no. 5, May 1982 p 65-67 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

N83-11711# Joint Publications Research Service, Arlington, Va.
MEDICAL USES FOR LASERS
O. Semenova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 45-47 Transl. into ENGLISH from Leninskoye Znamya (USSR), 16 May 1982 p 4 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

N83-11712# Joint Publications Research Service, Arlington, Va.
HELIUM-NEON LASERS IN TREATMENT OF PATIENTS WITH ODONTOGENIC INFLAMMATORY DISEASES
D. L. Korytnyy, T. K. Supiyev, and D. M. Artygaliyeva *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 48-51 refs Transl. into ENGLISH from Zdravookhr. Kaz. (USSR), no. 6, Jun. 1982 p 42-44 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

N83-11713# Joint Publications Research Service, Arlington, Va.
ACCIDENTAL LASER INJURY TO FUNDUS OF BOTH EYES
V. M. Gayday and V. I. Filippenko *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 52-54 Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 5, May 1982 p 56-58 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

N83-11714# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF HYPERBARIC OXYGENATION AT MEDICAL EVACUATION STAGES
S. B. Gatagov, A. A. Rafalskiy, and A. F. Litavrin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 23 (JPRS-82060) 25 Oct. 1982 p 66-71 Transl. into ENGLISH from Voyenno-Med. ZH. (USSR), no. 5, May 1982 p 16-19 (For primary document see N83-11707 02-51)
Avail: NTIS HC A07

N83-11717# Joint Publications Research Service, Arlington, Va.
CHANGES IN BLOOD CLOTTING SYSTEM AFTER SURGICAL INTERVENTION ON LUNGS WITH EXPOSURE TO STATIC MAGNETIC FIELD
Yu. A. Novikov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 4-7 refs Transl. into ENGLISH from Anesteziologiya i Reanimatologiya (Moscow), no. 3, May - Jun. 1982 p 21-23 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11718# Joint Publications Research Service, Arlington, Va.
MAGNETOTHERAPY OF TRAUMA AND SOME DISEASES OF ATHLETES
I. S. Shepeleva, Yu. F. Kamenev, N. A. Demetskaya, Yu. V. Bogdanov, V. G. Slyusarenko, and K. Sh. Bekseitov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 8-11 refs Transl. into ENGLISH from Teoriya i Prakt. Fiz. Kultury (Moscow), no. 3, Mar. 1982 p 56-58 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11719# Joint Publications Research Service, Arlington, Va.
ROLE OF GEOMAGNETIC FIELD IN ALTERATION OF ERYTHROCYTE SURFACE MEMBRANE PROPERTIES IN PATIENTS WITH CHRONIC, NONSPECIFIC LUNG DISEASES
V. P. Pyatkin and V. L. Semenov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 12-16 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 12-15 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11720# Joint Publications Research Service, Arlington, Va.
EFFECT OF STATIC MAGNETIC FIELD ON COMPRESSION OF CAROTID ARTERIES AND ASPHYXIA (EXPERIMENTAL STUDY)
S. V. Rutsay *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 17-20 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 15-18 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11721# Joint Publications Research Service, Arlington, Va.
USE OF SONIC RANGE MAGNETIC FIELDS IN TREATMENT OF SOME DISEASES
A. G. Kakuliya, L. A. Abuladze, L. G. Glonti, M. N. Melikishvili, and L. S. Urpanishvili *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 21-24 refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lechebnoy Fiz. Kultury (Moscow), no. 3, May - Jun. 1982 p 18-21 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11723# Joint Publications Research Service, Arlington, Va.
USE OF LASERS IN SURGERY
A. S. Kryuk, V. P. Kostyuk, V. P. Dolgolikov, N. S. Serdyuchenko, and Ye. F. Platkovskiy *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 51-56 refs Transl. into ENGLISH from Zdravookhraneniye Belorussii (Minsk), no. 4, Apr. 1982 p 52-54 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

N83-11724# Joint Publications Research Service, Arlington, Va.
NEW BOOK ON LASER TREATMENT OF WOUNDS
A. K. Polonskiy, Ye. I. Polishchuk, and V. A. Pavlov *In its* USSR Rept.: Life Sci. (JPRS-82061) 25 Oct. 1982 p 57-59 Transl. into ENGLISH from Klinich. Khirurgiya (Kiev), no. 2, Feb. 1982 p 58-59 (For primary document see N83-11715 02-51)
Avail: NTIS HC A05

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-11738*# Old Dominion Univ., Norfolk, Va. Center for Applied Psychological Studies.
THE EFFECTIVENESS OF INCORPORATING A REAL-TIME OCULOMETER SYSTEM IN A COMMERCIAL FLIGHT TRAINING PROGRAM Final Report, 4 Nov. 1981 - 3 Sep. 1982
Dennis H. Jones, Glynn D. Coates, and Raymond H. Kirby Oct. 1982 41 p refs
(Contract NCC1-57)
(NASA-CR-169465; NAS 1.26:169465) Avail: NTIS HC A03/MF A01 CSCL 05I

The effectiveness on pilot and trainee performance and scanning behavior of incorporating a real time oculometer system in a commercial flight training program was assessed. Trainees received simulator training in pairs requiring the trainees to alternate the order of training within a session. The 'third day phenomenon' of performance decrement was investigated, including the role of order of training on performance. M.W.

N83-11739# New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
HUMAN FACTORS AFFECTING PILOT PERFORMANCE IN VERTICAL AND TRANSITIONAL INSTRUMENT FLIGHT Interim Scientific Report, 15 Mar. - 31 Dec. 1981
Stanley N. Roscoe, J. C. Hull, Paul M. Simon, and Louis Corl Dec. 1981 66 p refs
(Contract N00014-81-K-0439; NR Proj. 196-170)
(AD-A118345; BEL-81-1/ONR-81-1) Avail: NTIS HC A04/MF A01 CSCL 05/5

A conceptual analysis and review of human factors problems in piloting VTOL aircraft including helicopters is presented. VTOL mission and flight requirements are contrasted with those of CTOLs. Deficiencies in present VTOL flight instrumentation are detailed. The requirement that information regarding ground-referenced and airmass-referenced position in all six degrees of freedom be presented to the VTOL pilot and/or incorporated into positional control stabilization is stated. Author (GRA)

N83-11740# Vanderbilt Univ., Nashville, Tenn. Dept. of Psychology.
THE EFFECT OF CONTEXT ON PERCEIVED DEPTH
Robert Patterson, Arthur T. Menendez, and Robert Fox Jul. 1982 26 p refs
(Contract N00014-81-C-0001; RR0420901; NR Proj. 197-067)
(AD-A117444; N14-0001-82C-0002) Avail: NTIS HC A03/MF A01 CSCL 05/10

The effect of context on the perceived depth positions of stereoscopic forms was studied. Data exist which suggest the perceived depth position of one stimulus can be influenced by the apparent depth positions of other stimuli. The effect of a large enveloping form on the perceived depth position of a smaller surrounded (test) form was examined when all cues for veridical distance and depth were present. The forms, which were contours formed from dynamic random element stereograms, were combined factorially in 36 experimental conditions: four levels of context, three viewing distances, and three levels of disparity value. Perceived depth did vary as a function of viewing distance and disparity value in accord with the geometry of stereoscopic space, but not as a function of context. Author (GRA)

N83-11741# Embry-Riddle Aeronautical Univ., Daytona Beach, Fla. Aviation Research Center.
PILOT JUDGMENT TRAINING AND EVALUATION, VOLUME 2 Final Report, Jun. 1981 - Mar. 1982
J. I. Berlin, E. V. Gruber, and C. W. Holmes Jun. 1982 181 p
(Contract DOT-FA79NA-6040)
(AD-A117667; FAA-CT-82-56-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 05/9

This manual contains instructional material for student use in conjunction with the pilot judgment training program. It contains 18 lessons which are divided into three units. Unit I presents terms and concepts designed to develop modified patterns of thinking and to give students and instructors the most objective means possible for discussing pilot behavior. Unit II addresses behavioral aspects of judgment, including hazardous thoughts and stress. Unit III relates the learning of Units I and II to actual flight situations using scenarios based on actual pilot accident reports. This manual is intended as a training aid and workbook requiring a minimum of supplemental teaching by the flight instructor. GRA

N83-11742# Navy Personnel Research and Development Center, San Diego, Calif.
HUMAN MEMORY LIMITATIONS IN MULTI-OBJECT TRACKING Interim Report, Jun. 1980 - Nov. 1981
Frank L. Greitzer, Richard T. Kelly, and Ramon L. Hershman Jun. 1982 41 p refs
(AD-A117586; NPRDC-TR-82-48) Avail: NTIS HC A03/MF A01 CSCL 05/10

Basic performance data were obtained on the effect of critical task variables in unaided multi-object tracking behavior. Six observers viewed computer-generated displays in which five, seven, or nine objects represented targets that moved in random linear trajectories at one of two speeds. Displayed positions were updated six times at intervals of 5, 8, 13 or 18 seconds, and no track history was provided. The task for the observer was to monitor the trajectories and then predict the next position of each object. Results showed that the unaided observer can keep track of up to about seven moving objects. Performance improved as the interval between updates was increased to about 13 seconds. These variables interact in their effects on tracking performance and may be trade off in a complex manner. A family of mathematical models of human memory that focus on the encoding, learning, and rehearsal processes of the observer was developed. Two of the models' predictions were consistent with the data observed and those reported in the psychological literature. The analysis of human memory and information processing limitations should be extended to more complex operational tasks to support system designers with quantitative estimates of operator performance.
Author (GRA)

N83-11743# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Verkeersgedrag.
THE DRIVING SKILL OF REHABILITANTS WITH A DIFFUSE TRAUMATIC BRAIN INJURY. A PRELIMINARY APPROACH
R. Ravestein, I. H. Veling, and A. W. K. Gaillard Jun. 1982 28 p refs In DUTCH; ENGLISH summary
(Contract A81/D/025)
(IZF-1982-16; TDCK-76638) Avail: NTIS HC A03/MF A01

By request of the Military Rehabilitation Center in the Netherlands, 10 rehabilitants, suffering from traumatic injury of the brain, were examined with regard to their driving skills. The performance of the rehabilitants were compared with that of a control group over a number of driving tasks, psychological tests and reaction-time tasks. Results show that in all tasks the speed of performance is lower for rehabilitants, together with a tendency to a reduced
Gerald A. Gellin May 1969 22 p refs
(PB82-196262; TR-67) Avail: NTIS HC A02/MF A01 CSCL 06R

Laser injuries were confirmed in a followup survey of establishments that use lasers in California, Massachusetts and New Jersey. Eye injuries caused field defects but no blindness developed among those with retinal injuries. Electrical shocks were sustained but no

accuracy. With regard to specific stages of information processing (response selection and motor adjustment) no selective effects of the brain damage are found. Also, the rehabilitants do not meet any specific difficulties with the driving tasks. Author (ESA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-11744# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
THE USE OF MACHINE AIDS IN DYNAMIC MULTI-TASK ENVIRONMENTS: A COMPARISON OF AN OPTIMAL MODEL TO HUMAN BEHAVIOR Technical Report, 1 Feb. 1982 - 31 Jan. 1983
William T. Wood Jun. 1982 121 p refs
(Contract N00014-77-C-0256)
(AD-A118419) Avail: NTIS HC A06/MF A01 CSCL 05/8

Due to developments in the fields of computer and microprocessor technology, more and more tasks that previously only could be done by humans can now be assigned to machines. This study explores cases where such smart machines act as aids to human operators in dynamic multi-task systems. The operator must act as a supervisor and assign these machine aids to tasks he discovers. Author (GRA)

N83-11745*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex. Food Engineering Lab.
FOOD FOR US MANNED SPACE FLIGHT
Mary V. Klicka (Army Natick Research and Development Labs.) and Malcolm C. Smith, Jr. Apr. 1982 101 p refs
(Contract NASA-MIPR-T-9371A)
(NASA-TM-84850; NAS 1.15:84850; AD-A118316;
NATICK/TR-82/019) Avail: NTIS HC A06/MF A01 CSCL 06/8

The food systems which have supported the U.S. manned space flight programs have provided safe, nutritious, acceptable, and convenient food, compatible with the mission. The food systems which supported the Mercury, Gemini, and Apollo Flights and the Skylab and Apollo-Soyuz Missions are briefly described. Also, the engineering operational and biological constraints which were imposed in these food systems by the space vehicle and environment are discussed. Author (GRA)

N83-11746# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
A COMPARATIVE TEST OF A2 CLOTHING. PART 2: THERMAL ASPECTS
W. A. Lotens and E. J. M. Smienk 1979 20 p refs In DUTCH; ENGLISH summary
(Contract A78/KL/156)
(IZF-1979-21; TDCK-73403) Avail: NTIS HC A02/MF A01

Four types (English, German, French, and Belgian) of permeable chemical protective overgarments were evaluated. In order to test the thermal properties of the garments, eight subjects performed work on a bicycle ergometer in a climate of 30.4 C and 53% relative humidity. Physiological and temperature measurements were made. Clothing was worn in both open and closed condition. The calculated clothing parameters (heat insulation and water vapor conduction) show no difference between the garments, nor do the physiological measures. Under favorable conditions, the garments can be used during a two-hour march at air temperatures up to 30 C. Under worse conditions, the maximum tolerable air temperature can be as low as below zero C.
Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N83-11747# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
NATIONAL RESEARCH INSTITUTE FOR MATHEMATICAL SCIENCES REPORT AND RESEARCH PROGRAMME Annual Report, 1980 - 1981
Sep. 1981 97 p In AFRIKAANS and ENGLISH
(CSIR-SR-SWISK-27) Avail: NTIS HC A05/MF A01

Mathematics, operations research and statistics, and computer science research activities and plans are reported. Publications, reports, and lectures are reviewed. Staff and visitor activities are also reviewed. N.W.

N83-11748# Council for Scientific and Industrial Research, Pretoria (South Africa).
PROCEEDINGS OF THE SECOND SOUTH AFRICAN COMPUTER SYMPOSIUM ON RESEARCH IN THEORY, SOFTWARE AND HARDWARE
G. Wiechers, ed. 1981 308 p refs Symp. held in Pretoria, 27-30 Oct. 1981
(S-231) Avail: NTIS HC A14/MF A01

Computer programming, programming languages, hardware, and programming theory were discussed. For individual titles, see N83-11749 through N83-11770.

N83-11749# National Inst. for Water Research, Pretoria (South Africa).
DATABASE: ENVIRONMENT **c60**
M. Butty *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 19 p refs Sponsored by CSIR (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The analysis of ecological information using information analysis techniques is performed. A data capture system and the logical schema design for a relational data base are developed. It is shown that two distinct types of record organizations are required and that one of those under certain circumstances can be gainfully expanded to cover all information. This expansion leads to a schema design that permits better enforcement of the data dictionary specifications and allow inclusion of new fields without redesign of the data base schema. Author

N83-11750# Rand Afrikaans Univ., Transvaal (South Africa). Dept. Rekenaarwetenskap.
COMPUTER ACCURACY WITH SPECIAL EMPHASIS ON THE PROGRAMMING ASPECTS [REKENAARSEKURITEIT MET BESONDERE VERWYSING NA DIE PROGRAMMATUURASPEK] **c60**
J. H. P. Eloff *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 17 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The logical aspects of computer security are discussed by using a mathematical model. The identification of the problem leads to the definition of the various elements in such a model. Author

N83-11751# North Carolina Univ., Chapel Hill.
DETECTING ERRORS IN COMPUTER PROGRAMS. AN EXPERIMENTAL COMPARISON OF METHODS **c61**
Bill Hetzel (Blue Cross and Blue Shield of Florida) and Peter Calingaert *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 14 p refs (For primary document see N83-11748 02-59)
(Grant NSF GJ-30410)
Avail: NTIS HC A14/MF A01

A controlled experiment was designed and conducted to compare three methods for detecting errors in computer programs: disciplined, structured reading; specification or black-box testing; and a refined form of typical selective testing. Reading was found to be significantly inferior in effectiveness to the other two methods. Specification and selective testing did not differ significantly from each other. On the average, subjects found little more than half the errors present, even on a severity-weighted basis. Good performance in detecting errors was found to be closely associated with the experimental subjects' computing education, computing background, and self-confidence in performing the experimental tasks. Little association with the amount of time spent in detection was found. The distribution of time to detect the next error was observed to be approximately uniform. Author

N83-11752# Council for Scientific and Industrial Research, Pretoria (South Africa).
THE EFFICIENCY OF SYSTEM DEVELOPMENT AND ITS DETERMINING FACTORS **c82**
K. G. vanderPoel *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The efficiency of data processing systems development (DPSD) is of great significance, but previous studies have only dealt with certain aspects of the problem. Based on three elementary premises, a working measure of efficiency of DPSD was constructed. The validity and reliability of this measure were tested in two separate investigations and found to be acceptable. These investigations show a substantial variation in efficiency as well as divergence of practices of DPSD. Control of the efficiency of DPSD may be enhanced by visualizing the interaction between groups of factors and the system development life cycle. Author

N83-11753# Council for Scientific and Industrial Research, Pretoria (South Africa).
RESTRUCTURING OF THE CONCEPTUAL SCHEMA TO PRODUCE DBMS SCHEMATA **c82**
S. Wulf (Comcon Pty. Ltd., Sandton) *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 13 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

An overall methodology for data base design is presented. This includes creation of a data dictionary and relational analysis. An algorithm is presented to create a conceptual schema or logical data base design from the set of third normal form relations. The primary emphasis of this paper is to present algorithms for restructuring the conceptual schema to create first pass designs (FPD) for particular data base management systems (DBMS). These FPDs can then be used as the basis for iterative physical data base design and performance predictions. Examples are given for creating FPDs for TOTAL and IMS. These can be extended for any other DBMS. Indications are given for future research in extending the methodology. Author

N83-11754# Natal Univ., Pietermaritzburg (South Africa). Dept. of Mathematics.
AN ALTERNATIVE DEVELOPMENT OF THE VIENNA DATA STRUCTURES **c82**
N. C. K. Phillips *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 10 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

An axiomatic specification of a data type which is shown to be equivalent to the Vienna data structures is presented. The advantage of this alternative approach is its obvious simplicity. Author

N83-11755# North Carolina Univ., Chapel Hill. Dept. of Computer Science.
CASE-GRAMMAR REPRESENTATION OF PROGRAMMING LANGUAGES **c61**
Judy Mallino Popelas and Peter Calingaert *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The correction of errors in programs can be based on an analysis that subordinates syntactic relationships to functional relationships among elements of a program. For this purpose, case grammars, originally developed to model natural languages, are adapted to model programming languages. The component parts of such a modified case grammar are described, and a case grammar for a subset of PASCAL presented. Author

N83-11756# South Africa Univ., Pretoria. Dept. of Computer Science and Information Systems.
THE DESIGN OBJECTIVES OF QUADLISP **c61**
Stef W. Postma *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 7 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A02/MF A01

QUADLISP is a symbol manipulation language for sophisticated users, and it is an improper extension of LISP 1.5 (in the same sense that PASCAL is an improper extension of ALGOL). Elements from LISP thus are basic to the language, but other objectives such as data-typing and general principles of modern language design have also been incorporated. Pertinent aspects of these considerations are discussed, followed by a discussion of the pragmatic considerations. Pragmatics relate to the use of the language on machines, or just by people as a tool for developing programs. Author

N83-11757# South Africa Univ., Pretoria. Dept. of Computer Science.
THE PRINCIPLES OF QUADLISP **c61**
Stef W. Postma *In* CSIR Proc. of the 2nd South Africa Computer Symp. on Res. in Theory, Software and Hardware 1981 18 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

One of the design objectives that was set for QUADLISP is that a programmer should, on the basis of a few clear principles, be able to understand a program text. The principles relate to: data structures, declaration and scope of variables, the evaluation strategies and tactics, and the principles of the control structures. Another objective of the language design (unity and integrity) is incidentally demonstrated in the text. Author

N83-11758# South Africa Univ., Pretoria. Dept. of Computer Science.
MENGER'S THEOREM IN A NEBULA **c64**
H. O. VanRooyen *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

Nebula theory deals with diagrammatically presentable relational structures, and may be seen as a generalization of the theory of diagraphs with interesting application potential in A.I and in database theory. Menger's theorem in a digraph is probably best known in its 'edge' form, which is applicable to transport network problems in its 'max-flow min-cut' form. Some of the basic concepts of nebula theory are introduced, the difficulty of formulating a Mengerian theorem for nebulas indicated, and a 'vertex' form of a theorem which is claimed to be proven. Author

N83-11759# Council for Scientific and Industrial Research, Pretoria (South Africa).

THE DEFINITION AND IMPLEMENTATION OF THE SCRAP PROGRAMMING LANGUAGE [DIE DEFINISIE EN IMPLEMENTASIE VAN DIE TAAL SCRAP] **c61**
Martha H. VanRooyen (NNWW, Pretoria, South Africa) *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 16 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The high-level language SCRAP provides facilities for systems programming, but can equally well be used for applications programming. The prominent features of the language are a well defined syntax, a modular structure, machine dependent data types, and the possibility of communication with the underlying system. It is implemented by a self-compiling compiler. Compilation consists of three passes: syntax analysis and semantic analysis, forming the machine independent part; and code generation, the machine-dependent part. Author

N83-11760# National Inst. for Telecommunications Research, Johannesburg (South Africa).
OMEGA NAVIGATOR CONTROL AND COMPUTATION **c04**
P. J. Cabion *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 17 p (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

A portable microprocessor based receiver was constructed to use the Omega very low frequency radio global all weather navigational system. The hardware and software being developed for this navigator are described with emphasis on those aspects common to the development of low cost computing facilities. A.R.H.

N83-11761# Cape Town Univ. (South Africa).
A CSP DESCRIPTION OF SOME PARALLEL SORTING ALGORITHMS **c61**
M. H. Linck *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

Hoare's CSP notation is used to describe 3 parallel sorting algorithms. The first algorithm uses n/2 processes working in parallel, the second uses an array of n parallel processes and the third algorithm is a parallel version of quicksort. Author

N83-11762# Cape Town Univ. (South Africa).
DATA STRUCTURE TRACES **c61**
S. R. Schach *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

Three levels of traces for data structures (as opposed to simple variables) are defined. A machine-code core dump is essentially a low level trace. A high level trace reflects the high level language in which the data structure being traced has been implemented. A very high level trace displays the data structure in the format in which the programmer conceptualizes it. Three traces written by the author (a graphical FORTRAN array trace, a portable tract for the PASCAL heap, and a graphical PASCAL data structure trace) are described, and the level of each trace is then analyzed. Author

N83-11763# Sperry Univac, Johannesburg (South Africa).
THE OPERATIONAL SINGLE SERVER MODEL [DIE OPERSIONELE ENKELBEDIENRMODEL] **c65**
J. C. VanNiekerk *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 13 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The operational approach to the analysis of the single server model is discussed. Buzen's operational equivalent to the stochastic birth-death Markov model is presented, whereafter generalizations of the model are examined. The performance indicators are derived for these models. Author

N83-11764# Council for Scientific and Industrial Research, Pretoria (South Africa).
ASPECTS OF A COMPUTER-AIDED DESIGN AND FINITE-ELEMENT SIMULATION BY SMALL COMPUTERS [ASPEKTE VAN REKENAAR-ONDERSTEUNDE ONTWERP EN EINDIGE-ELEMNTSIMMULASIE OP TAFELREDENAARS] **c61**
F. J. DeWet (Rekor, Edms, Bpk., Pretoria) *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 10 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

Computer aided design and finite element analysis developed to same extent along the same lines. The development of desktop computers and micros led to small systems with powerful capabilities and sophisticated graphics. Two important sspects in programming for computer aided design and finite element analysis on desktop computers are the data structure and the graphic manipulations. Most desktop have only BASIC as a high level language but some of the standard functions can be used quite effectively towards saving memory and simplifying graphic manipulations. Author

N83-11765# Witwatersrand Univ., Johannesburg (South Africa).
RAMROD: A MULTI-MICROPROCESSOR COMPUTER **c60**
A. E. Rabinowitz and M. G. Rodd *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 19 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

Because of hardware and software complexity, computer designers face problems when they attempt to achieve high throughput, inherent fault tolerance, and high reliability by using microprocessors as processing elements. Some existing architectures are discussed and their inherent disadvantages are indicated. A system is proposed which uses identical processor and memory elements to attain a high degree of fault tolerance. There is no distinction between local and global memory. The processor-memory switch permits the use of a single universal memory. RAMROD, as the structure is called, is presently under construction and first results indicate that an extremely simple yet flexible and powerful system can be achieved. A.R.H.

N83-11766# Witwatersrand Univ., Johannesburg (South Africa).
REDUCING CROSS-BUFFER UPDATES IN MULTIPROCESSORS **c60**
T. Turton *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 18 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

High performance multiprocessor systems are generally limited by memory bandwidth constraints. Two approaches are described which largely overcome this limitation, and make it possible to connect a much greater number of processors together in a multiprocessor configuration, allowing greater system throughput rates to be achieved. Author

N83-11767# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
MICRO-CODE IMPLEMENTATION OF LANGUAGE INTERPRETERS **c60**
P. P. Roets *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 11 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The improvement of language interpreters by coding recurring sequences of instructions in microcode was evaluated. The results of an experiment with PASCAL indicate that the increase in speed expected may not always be realized but that, somewhat surprisingly, microcode may be used to reduce the effort of implementing an interpreter. Author

N83-11768# Cape Town Univ. (South Africa). Dept. of Computer Science.
THE ANALYSIS OF CODE GENERATION ALGORITHMS FOR THE UNIVAC 1100 COMPUTER c61
C. Block and K. J. MacGregor *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 1 p (For primary document see N83-11748 02-60)
Avail: NTIS HC A14/MF A01

In any compiler the efficiency of the program produced, to a large extent, depends on the effectiveness of the code generation routine. For a one address computer, with many registers, such as the Univac 1100 series computer, the possibility exists to produce optimised code, making effective use of the registers. Existing code generation algorithms embedded in production compilers in the Univac 1100 were analyzed to ascertain the degree and effectiveness of their optimization. Intermediate codes, easily produced by block structured languages such as P-code and TCOL were studied to determine whether any extensions could be made to these codes to provide more effective code generation. It was found that by a suitable choice of intermediate code fast compilation together with efficient execution could be achieved. Author

N83-11769# International Computers Ltd., London (England).
THE CONTENT ADDRESSABLE FILE STORE c82
V. A. J. Maller *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The use of functionally specialised hardware to improve the performance of general purpose information systems is of interest particularly in the case of information retrieval and data management. Although there is a rich variety of opinions as to the characteristics of such hardware, there is general agreement that more potential exists in this approach than on further improvements in software running on conventional processing machines. Author

N83-11770# Council for Scientific and Industrial Research, Pretoria (South Africa).
MANAGING AND DOCUMENTING 10-20 MAN YEAR PROJECTS c81
P. Visser *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

The management of software development is not different from normal management, yet it is known to be difficult. The reasons can be found in the characteristics of software development which resembles research work in most management aspects. The method of implementation of management techniques must therefore be adapted to these characteristics: (1) not visible in the normal sense; (2) production facilities not obvious. (3) type of personnel - highly skilled; (4) peoples systems; (5) end product defined as part of production - direct control is not possible as for manufacture; and (6) measurement dependent on judgement. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N83-11771# Higher Order Software, Inc., Cambridge, Mass.
DATA BASE QUERY WITHIN HOS SYSTEMS METHODOLOGY Final Report, 1 Jan. - 30 Jun. 1982
Richard Smaby Jul. 1982 57 p refs
(Contract N00014-82-C-0137; RR0420901; NR Proj. 196-172)
(AD-A118369; HOS-TR-35) Avail: NTIS HC A04/MF A01 CSCL 05/2

Applying the theory language and tools of system specification methodology of HOS to data base query promises to yield a data-base query tool which is accessible to users with broad analytic capabilities independent of knowledge of computing. Author (GRA)

N83-11772# New Mexico State Univ., Las Cruces. Dept. of Electrical and Computer Engineering.
DESIGN METHODOLOGY FOR MULTIPLE MICROCOMPUTER ARCHITECTURES Final Report
G. M. Flachs, G. M. Chavez, and B. N. Malm Jul. 1982 34 p refs
(Contract DAAG29-79-C-0100)
(AD-A118092; NMSU-TR-82-1; ARO-16381.6-EL) Avail: NTIS HC A03/MF A01 CSCL 09/2

A mathematical model is developed for designing and analyzing multiple microcomputer architectures. The model combines a user application algorithm, a generalized distributive operating system, and a generalized multiprocessor architecture into an integral system representation. When applied to realtime design problems, it provides a method to establish the processing and communication resources required to meet real-time constraints. Author (GRA)

N83-11773# Fondazione Ugo Bordoni, Rome (Italy).
A PROTOCOL FOR A VIRTUAL TERMINAL [SU UN PROTOCOLLO PER TERMINALE VIRTUALE]
Antonio Cassese, Achille Pattavian, and Aldo Roveri Dec. 1981 26 p refs In ITALIAN
(FUB-32-1981) Avail: NTIS HC A03/MF A01

The characteristics and applications of virtual terminals, used for minimizing the computer/terminal interactions in complex computer network design, are described. The functional characteristics of a protocol for virtual terminals (VTP) are examined, including the special procedures for exchanges between virtual terminals and for interrupting data exchanges. A block diagram showing the allocation of the VTP in a computer network model is included. Author (ESA)

N83-11774# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Human Engineering Group.
COMPUTER COMPATIBLE DISPLAY DEVICES: A STUDY OF OPTIMALIZED DEVICES WITH STATIC AND MOVING TARGETS
P. T. W. Hudson Mar. 1982 29 p refs
(Contract A77/KM/132)
(IZF-1982-4; TDCK-76169) Avail: NTIS HC A03/MF A01

Five devices, used to communicate with a computer controlled display, were compared. A task was used in which such a device captures a succession of targets on a display. The task enabled the time per target to be an adequate measure of both speed and accuracy. Preliminary studies validated the task and found the best ratios of movement of a device to movement of a cursor on the screen for such devices as rolling balls and joysticks. The final study used optimalized situations with targets which were either stationary or which moved at one of two speeds. In order to provide a general evaluation schema, the objective speed measures are listed with a number of more subjective evaluations. No single device is found to be perfect, but the light pen is the fastest device and it is unaffected by target size and speed. Author (ESA)

N83-11775# National Bureau of Standards, Washington, D.C. Center for Programming Science and Technology.
COMPUTER SCIENCE AND TECHNOLOGY: SOFTWARE DEVELOPMENT TOOLS Final Report
Raymond C. Houghton, Jr. Mar. 1982 196 p refs
(PB82-218066; NBS-SP-500-88; LC-82-600517) Avail: NTIS HC A09/MF A01 CSCL 09B

As a part of the program to provide information to Federal agencies on the availability, capabilities, limitations, and applications of software development tools, a database of information about existing tools was collected over a 3-year period. The purpose of this report is to present an analysis of the information contained in the database. Various categorizations of the tools are presented

in classes listed by their characteristic features. The lists incorporate percentage summaries that are based on the total number of tools for which information is stored in the database. Trends found in the lists are analyzed and discussed. Abstracts of each tool are presented in an appendix. Author (GRA)

N83-11776# California Univ., Los Angeles. Graduate School of Management.
SURVEY OF STATE-OF-THE-ART LOGICAL DATABASE DESIGN TOOLS Final Report
Peter P. Chen, Ilchoo Chung, and Dennis Perry Apr. 1982 93 p (Contract NB80-SBCA-0528)
(PB82-209735; NBS-GCR-82-389) Avail: NTIS HC A05/MF A01 CSCL 09B

State-of-the-art logical database design tools were surveyed. Data base design tools which are related to requirements analysis and physical database design are not included. The names of the developers, their addresses, the characteristics of the tools, references, and other information are presented. Only those tools deemed most representative of their type were included. Author (GRA)

N83-11749# National Inst. for Water Research, Pretoria (South Africa).
DATABASE: ENVIRONMENT
M. Butty *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 19 p refs Sponsored by CSIR (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11750# Rand Afrikaans Univ., Transvaal (South Africa). Dept. Rekenaarwetenskap.
COMPUTER ACCURACY WITH SPECIAL EMPHASIS ON THE PROGRAMMING ASPECTS [REKENAARSEKURITEIT MET BESONDERE VERWYSING NA DIE PROGRAMMATUURASPEK]
J. H. P. Eloff *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 17 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11765# Witwatersrand Univ., Johannesburg (South Africa).
RAMROD: A MULTI-MICROPROCESSOR COMPUTER
A. E. Rabinowitz and M. G. Rodd *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 19 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11766# Witwatersrand Univ., Johannesburg (South Africa).
REDUCING CROSS-BUFFER UPDATES IN MULTIPROCESSORS
T. Turton *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 18 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11767# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
MICRO-CODE IMPLEMENTATION OF LANGUAGE INTERPRETERS
P. P. Roets *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 11 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-11777# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BASIC IDEAS FOR THE IMPLEMENTATION OF MICROPROGRAMMED CONTROLS [IDEIAS BASICAS PARA A IMPLEMENTACAO DE CONTROLES MICROPROGRAMADOS]
Almir Cavalcanti Lemos Filho Jul. 1982 45 p refs In PORTUGUESE; ENGLISH summary
(INPE-2479-NTE/189) Avail: NTIS HC A03/MF A01

The implementation of digital systems control part by microprogramming is discussed. The advantages and the disadvantages are presented as well as some control structures that incorporate basic ideas related to the application of this method of design. Author

N83-11778# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A GENERAL STRUCTURE FOR APPLICATION SOFTWARE FOR SPACE MISSION CONTROL [UNA ESTRUTURA GERAL PARA O SOFTWARE DE APLICACAO AO CONTROLE DE MISSOES ESPACIAIS]
Decio Castilho Ceballos Jun. 1982 7 p refs In PORTUGUESE; ENGLISH summary Presented at the 4th Brazilian Congress on Automation, Sao Paulo, Brazil, 14-17 Sep. 1982
(INPE-2442-PRE/143) Avail: NTIS HC A02/MF A01

A software structure with modularity and flexibility is presented for artificial satellite space missions control applications. System flexibility results from the fact that subsystems can be invoked almost independently of any sequence. The modular structure facilitates development and adaptations to other missions, as well as minimizes the computational resources needed for implementations. In terms of computational load that software is classified in two groups. The first, requires large computers, reasonable memory and accuracy capabilities, and sparce utilization. The second suggests the use of distributed processing in minicomputers due to the characteristic of intensive and repetitive processings, short time-response, small memory, and low precision. Performance and quality requirements as well as implementations aspects are described and discussed. M.G.

N83-11779# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DEVELOPMENT OF MICROPROGRAMMED SYSTEMS: THE GENERATION OF MICROCODES [DESENVOLVIMENTO DE SISTEMAS MICROPROGRAMADOS: GERACAO DE MICROCODIGOS]
Wilson Yamaguti May 1982 20 p refs In PORTUGUESE; ENGLISH summary
(INPE-2395-PRE/112) Avail: NTIS HC A02/MF A01

Some aspects of a microprogramming language called LMP are presented as a microcode generation tool in the microprogrammed System Development Station. The basic design goal of this language is to provide a tool for horizontal microprogramming and its documentation in a standard way. Author

N83-11780# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GRAPHIC TECHNIQUES FOR THE ANALYSIS OF MULTIVARIATE DATA: APPLICATIONS IN THE ANALYSIS OF NATURAL RESOURCES M.S. Thesis [TECNICAS GRAFICAS PARA ANALISE DE DADOS MULTIVARIADOS: APLICACOES NA ANALISE DE RECURSOS NATURAIS]
Jorge Luiz Cerqueira Apr. 1982 92 p refs In PORTUGUESE; ENGLISH summary
(INPE-2386-TDL/085) Avail: NTIS HC A05/MF A01

Techniques for a two dimensional representation of multivariate data are discussed. The main linear methods and a system, implemented on a computer, which applies these methods are

described. The applications are done in the analysis of multispectral images of natural resources. S.L.

N83-11781# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
DOCUMENTATION OF THE MULTI-CLOUD PROGRAM MULTI
M. K. Yau (McGill Univ.) Nov. 1981 48 p refs
(CSIR-TWISK-237) Avail: NTIS HC A03/MF A01

The documentation for the multi-cloud program, MULTI, is presented. The multi-cloud model is designed to simulate the development of an ensemble of cumulus clouds. It represents an extension of the single-cloud model to include random surface heating as an initiation mechanism for convection. In addition, surface moisture fluxes from the ground and the buoyancy enhancement of turbulence are included. Differences between the single- and multi-cloud models are discussed. The theoretical aspects and the results of some simulations which serves as examples are included. M.G.

N83-11782# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
XAID: AN EXTENDED AUTOMATIC INTERACTION DETECTOR
Charlotte Heymann Dec. 1981 34 p refs
(CSIR-SR-SWISK-28; ISBN-0-7988-2304-6) Avail: NTIS HC A03/MF A01

The main features of the automatic interaction detection method are described. The data analysis technique identifies combinations of values for subsets of predictor variables which best define a homogeneous grouping of values of the dependent variable. A FORTRAN 4 program is described for performing the analysis. Instructions for the use of the program are given, together with guidelines for the interpretation of the output. M.G.

N83-11783# National Physical Research Lab., Pretoria (South Africa). Div. of Optical Sciences.
USE OF IBM OS/VS2 TSO COMMAND PROCEDURE LANGUAGE IN SETTING UP JOB CONTROL LANGUAGE FOR BACKGROUND EXECUTION WITH SPECIAL REFERENCE TO THE VICAR IMAGE PROCESSING SYSTEM
E. E. W. Hesse Oct. 1981 28 p
(CSIR-SR-FIS-272; ISBN-0-7988-2262-7) Avail: NTIS HC A03/MF A01

Advantages and disadvantages of IBM command porcedure language as a programming language are discussed. Methods of overcoming some of its inadequacies are shown, illustrated by a specific example which generates a job control language for a VICAR image processing task. Author

N83-11784*# Mississippi State Univ., State College. Engineering and Industrial Research Station.
HIGH DENSITY BIT TRANSITION REQUIREMENTS VERSUS THE EFFECTS ON BCH ERROR CORRECTING CODE Interim Report
Frank M. Ingels and William O. Schoggen 1982 130 p refs
(Contract NAS8-33887)
(NASA-CR-170643; NAS 1.26:170643; MSSU-EIRS-EE-82-4) Avail: NTIS HC A07/MF A01 CSCL 09B

The design to achieve the required bit transition density for the Space Shuttle high rate multiplexes (HRM) data stream of the Space Laboratory Vehicle is reviewed. It contained a recommended circuit approach, specified the pseudo random (PN) sequence to be used and detailed the properties of the sequence. Calculations showing the probability of failing to meet the required transition density were included. A computer simulation of the data stream and PN cover sequence was provided. All worst case situations were simulated and the bit transition density exceeded that required. The Preliminary Design Review and the critical Design Review are documented. The Cover Sequence Generator (CSG) Encoder/Decoder design was constructed and demonstrated. The demonstrations were successful. All HRM and HRDM units incorporate the CSG encoder or CSG decoder as appropriate. Author

N83-11785# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LANAC: AN EXPERIENCE IN THE DEVELOPMENT OF A PROCESS CONTROL LANGUAGE [UMA EXPERIENCIA NO DESENVOLVIMENTO DE UMA LINGUAGEM PARA CONTROLE DE PROCESSOS]
Sergio Donizetti Fischer, Ladislau Jose Nave daSilva, and Celso deRenna eSouza Apr. 1982 9 p refs In PORTUGUESE; ENGLISH summary Presented at the Seminario on Basic Software Systems Develop.
(INPE-2377-PRE/102) Avail: NTIS HC A02/MF A01

LANAC, a high level ALGOL-like language, was developed. It is capable of defining concurrent processes. A brief description of the language development is presented. Author

N83-11786# Orlando Technology, Inc., Shalimar, Fla.
HULL USER GUIDE FOR 3-DIMENSIONAL LINKING WITH EPIC 3 Final Report, Jul. 1979 - Jul. 1980
Daniel A. Matuska, Richard E. Durrett, and John J. Osborn Jul. 1982 111 p refs
(Contract DAAK11-70-C-0106; DA Proj. 1L1-62618-AH-80)
(AD-A118385; AD-F300068; ARBRL-CR-00484) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report documents the development of the HULL Eulerian hydrocode as a three-dimensional link to provide time-dependent boundary conditions to the Lagrangian EPIC3 code. During a linked calculation, the penetrator and target are represented in the HULL Eulerian mesh and the calculation is carried to target perforation. After perforation, the data collected in the Eulerian mesh is used as velocity boundary conditions to drive the nodes of the EPIC3 penetrator definition. This two-step procedure is more efficient than a single Eulerian or Lagrangian calculation, since the Eulerian code can be optimally run to handle the severe distortions and deformations during perforation, and a well defined representation of the penetrator can be used in the course of the Lagrangian calculation at late times when slower deformation processes are dominant. GRA

N83-11787# Defence Research Establishment, Ottawa. (Ontario). Chemical Defence Section.
A COMPUTER PROGRAM IN FINNIGAN BASIC FOR PLOTTING REPORT-QUALITY GRAPHS USING A FINNIGAN 6115 DATA SYSTEM
J. Garfield Purdon and Jonathan M. Preston Mar. 1981 48 p refs In ENGLISH; FRENCH summary
(AD-A118227; DREO-TN-82-3) Avail: NTIS HC A03/MF A01 CSCL 09/2

A BASIC computer program has been developed for drawing either half-or full-page-size report-quality graphs of externally generated data on a Finnigan 4010 Gas Chromatograph/Mass Spectrometer Data System. Up to five sets of results can be linearly, logarithmically or inversely presented. As well as drawing the borders and printing labels supplied by the user, the program selects appropriate divisions for the axes and scales the data accordingly. Either solid straight lines joining all points or solid or dashed straight lines resulting from an internal linear least squares calculation can be included on the graph. Provision has also been made for the inclusion of threshold lines on the graph if desired and for the separate printing of lines of alphanumeric and plotting characters for use in captions or headings. A listing, flow-chart and set of simplified instructions for its use are included. Author (GRA)

N83-11788# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
A MODEL FOR ESTIMATING TACTICAL SOFTWARE MAINTENANCE REQUIREMENTS M.S. Thesis
William H. Merring, III Jun. 1982 52 p refs
(AD-A118211) Avail: NTIS HC A04/MF A01 CSCL 09/2

Recent studies have pointed to the increasing burden that is software maintenance. The maintenance of tactical systems software will demand resources that exceed those expended during the development phase as their numbers and time-in-service

increase. This increased demand for resources requires more effective management of the maintenance phase and development of the software with maintenance in mind. This thesis presents those items that should be considered and utilized during the development phase to reduce maintenance costs over the lifecycle of the system. It also presents a model that uses the known configuration of the program to estimate the maintenance personnel requirements for that system. These requirements will be estimated from the beginning of the maintenance phase to its completion. The model utilizes the techniques of measuring the characteristics of the software to obtain the estimation.
Author (GRA)

N83-11789# Virginia Polytechnic Inst. and State Univ., Blacksburg.
THE ROLE AND TOOLS OF A DIALOGUE AUTHOR IN CREATING HUMAN-COMPUTER INTERFACES
Deborah H. Johnson and H. Rex Hartson May 1982 84 p refs
(Contract N00014-81-K0143)
(AD-A118146; CSIE-82-8) Avail: NTIS HC A05/MF A01 CSCL 05/8

In order to facilitate the development of human-factored human-computer interfaces, a Dialogue Management System (DMS) is being created. Dialogue independence and internal and external dialogue have developed as underlying concepts of DMS, and are manifest in the separation of the dialogue components of a software system from the computational components. In a new system design role, a dialogue author is responsible for creating the dialogue which constitutes the human-computer interface of an application system. Author (GRA)

N83-11790# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.
HUMAN-COMPUTER SYSTEM DEVELOPMENT METHODOLOGY FOR THE DIALOGUE MANAGEMENT SYSTEM
Tamer Yunten and H. Rex Hartson May 1982 103 p refs
(Contract N00014-81-K-0143; RR0420901)
(AD-A118287; CSIE-82-7) Avail: NTIS HC A06/MF A01 CSCL 09/2

In this report a system development methodology for human computer systems is constructed. The methodology views humans as functional elements of a system in addition to computer elements. The disciplined approach of the software engineer (SWE) and the user oriented approach of the human factors engineer (HFE) are combined into a methodology which features a parallel and cooperative work environment. GRA

N83-11791# Colorado Univ., Boulder. Dept. of Computer Science.
THE TOOLPACK MATHEMATICAL SOFTWARE DEVELOPMENT ENVIRONMENT
Leon J. Osterweil 21 Jul. 1982 45 p refs
(Contracts DAAG29-80-C-0094; DE-AC02-80ER-10718; Grant NSF MCS-80-00017)
(AD-A118286; CU-CS-226-82; ARO-17124.5-MA) Avail: NTIS HC A03/MF A01 CSCL 09/2

This paper describes a research project aimed at building and studying prototype environments for Mathematical Software. The actual measurements and experiences that should help solidify knowledge about how to build effective environments. Towards this end some speculative ideas about environment file systems and command languages are presented, along with research plans for effectively evaluating these and other design notions.
Author (GRA)

N83-11792# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SUPER-CAD: AN INTEGRATED STRUCTURE FOR DESIGN AUTOMATION M.S. Thesis
Hobart S. Cable, II Jun. 1982 151 p refs
(AD-A118039; AFIT/GCS/EE/82J-7) Avail: NTIS HC A08/MF A01 CSCL 09/2

This project proposes a structure to integrate a variety of Computer-Aided Design tools into a complete design system. Design aids have provided valuable assistance to designers of integrated circuits over the last decade. However, greatly increased circuit complexity, with the approach of more than a million devices on a single chip, is exceeding the capabilities of current design methods. Greater automation and additional design tools are needed. A model is proposed which divides the design process into three stages: Specification, Implementation, and Realization. The Implementation stage is examined in detail. Design requirements can be described at different levels of abstraction, from a description of overall behavior to specific gate-level logic details. The model attempts to satisfy the requirements at the higher levels using existing implementation before resorting to the design of new circuits at the lowest level. GRA

N83-11793# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
AMPL: DESIGN, IMPLEMENTATION, AND EVALUATION OF A MULTIPROCESSING LANGUAGE
Roger B. Dannenberg 31 Mar. 1981 87 p refs
(Contract F33615-81-K-1539; Grant NSF SPI-7821198; ARPA Order 3597)
(AD-A117984) Avail: NTIS HC A05/MF A01 CSCL 09/2

AMPL is an experimental high-level language for expressing parallel algorithms which involve many interdependent and cooperating tasks. AMPL is a strongly-typed language in which all inter-process communication takes place via message passing. The language has been implemented on the Cm multiprocessor, and a number of programs have been written to perform numeric and symbolic computation. In this report, the design decisions relating to process communication primitives are discussed, and AMPL is compared to several other languages for parallel processing. The implementation of message passing, process creation, and parallel garbage collection are described. Measurements of several AMPL programs are used to study the effects of language design decisions upon program performance and algorithm design. Author (GRA)

N83-11794# Army Construction Engineering Research Lab., Champaign, Ill. Facilities Systems Div.
CAEDS: COMPUTER-AIDED ENGINEERING AND ARCHITECTURAL DESIGN SYSTEM Final Report
Janet H. Spoonamore Aug. 1982 23 p refs Presented at the Army Sci. Conf., West Point, N.Y., 15-18 Jun. 1982
(DA Proj. 4A7-62731-AT-41)
(AD-A117972; CERL-TM-P-133) Avail: NTIS HC A02/MF A01 CSCL 09/2

The U.S. Army Corps of Engineers Construction Engineering Research Laboratory is developing the Computer-Aided Engineering and Architectural Design System (CAEADS) to support the design of military facilities. CAEADS' support will start with initial requirements for a facility, and continue through concept and final design and the production of construction drawings, specifications and cost estimates. The CAEADS system will be integrated based on a central source of design information used by all the disciplines in the design process: users, project planners, architects, engineers, specification writers, and cost estimators and drafters. In October of 1981, the integration of the concept design tools of the CAEADS system was completed and a test initiated involving 200 projects in the Military Construction Army (MCA) FY84 program. This integrated system, called Concept CAEADS, is used to support preliminary design, from project requirements through to the 25 percent design level. Concept CAEADS provides tools for project information retrieval, facility layout, functional evaluation, energy evaluation, cost estimating and production of drawings. During the period 1 October 81 to February 82, one architectural engineering firm tested and used Concept CAEADS to design to 25 percent these 200 MCA projects. The findings of the test suggest that substantial design cost reductions will be realized. GRA

N83-11795# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
SYNTAX-DIRECTED EDITING: TOWARDS INTEGRATED PROGRAMMING ENVIRONMENTS Ph.D. Thesis

Raul Medina-Mora Mar. 1982 156 p refs Sponsored in part by National University of Mexico
(Contract F33615-81-K-1539; ARPA Order 3597)
(AD-A117970; CMU-CS-82-113) Avail: NTIS HC A08/MF A01 CSCL 09/2

One of the major goals of software engineering is to enhance programming quality and productivity, in particular, for producing large software systems. Programming language design and methodology have contributed towards this goal by developing and supporting concepts such as modularization and data abstraction and encapsulation. The MESA (Mitchell 78) and ADA (DoD 80) programming languages are examples of the evolution of these concepts. With these concepts, programming languages can support the static aspects of program construction by letting the programmer, among other things, describe the modular interfaces of his system, localize the decisions of representation, etc. Programming languages lack support for the dynamic aspects of the development and maintenance of large software systems: system developers must deal with different versions and compositions of the different pieces of a system, as well as with the interaction of several programmers in the development of a system. GRA

N83-11796# General Research Corp., Santa Barbara, Calif.
SOFTWARE TESTING MEASURES Final Technical Report, 1 Jun. 1980 - 30 Sep. 1981
W. Heidler, J. Benson, R. Meeson, A. Kerbel, and A. Pyster May 1982 369 p refs
(Contract F30602-80-C-0188; AF Proj. 5581)
(AD-A118254; GRC-CR-4-993; RADC-TR-82-135) Avail: NTIS HC A16/MF A01 CSCL 09/2

This report examines the current state of development of automated software testing techniques. The report identifies and describes techniques that are useful for detecting errors in software. It also examines techniques for proving the correctness of programs, for debugging (locating and correcting errors), and for producing documentation automatically. GRA

N83-11797# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF AN INTERACTIVE COMPUTER AIDED DESIGN PROGRAM FOR DIGITAL AND CONTINUOUS CONTROL SYSTEM ANALYSIS AND SYNTHESIS M.S. Thesis
Glen Thomas Logan Mar. 1982 290 p refs
(AD-A118042; AFIT/GE/EE/82M-5) Avail: NTIS HC A13/MF A01 CSCL 09/2

This report details the development of an interactive computer aided design package for digital and continuous control system analysis and synthesis. The baseline from which the new package is developed is an existing computer aided design package originally developed and hosted on a Control Data Corporation CYBER computer. A detailed analysis of the existing computer aided design package is provided. Structured analysis, structured design, and top-down design techniques are employed to design a modular program structure consisting of an executive, interactive user interface, processor (control system algorithms), and an output driver. An incremental top-down technique along with structured programming is used to implement the top-level structure of the new computer aided design package and a portion of the interactive user interface. The report also describes modifications to the existing package required to rehost it on a Digital Equipment Corporation VAX-11/780 computer in a virtual memory environment. Author (GRA)

N83-11798# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MICROPROGRAMMED PROCESSOR IMPLEMENTATION OF A SUBSET ADA CODE M.S. Thesis
Larry E. Lang Jun. 1982 206 p refs
(AD-A118073; AFIT/GCS/EE/82J-6) Avail: NTIS HC A10/MF A01 CSCL 09/2

This report describes a machine microprogramming and support software generation effort to enable the execution of ADA programs on a small embedded computer. The microprogrammable minicomputer emulator (MIME) resident in the AFIT Digital Engineering Laboratory is used as the ADA target machine. The ADA compiler used is resident on the Avionics Lab DEC-10 and produces pseudomachine code. The main effort of this project was to accomplish the microprogramming of the MIME to execute this pseudocode and to develop support software to facilitate transfer of ADA programs from the DEC-10 to the MIME. The final results indicate that the MIME provides an excellent capability for the study of ADA programming of embedded computers. GRA

N83-11799# Naval Research Lab., Washington, D. C. Computer Science and Systems Branch.
A COMPARISON OF ERRORS IN DIFFERENT SOFTWARE-DEVELOPMENT ENVIRONMENTS Interim Report
David M. Weiss 14 Jul. 1982 20 p refs
(RR0140941)
(AD-A118296; NRL-8598) Avail: NTIS HC A02/MF A01 CSCL 09/2

Error detection and error correction are now considered to be the major cost factors in software development. Much current and recent research has been devoted to finding ways to prevent software errors. The purpose of this paper is to compare error data obtained from two different software-development environments using different software-development methodologies. The data are used to characterize the similarities and differencies in the environments and may be used to evaluate the success with which different methodologies meet the claims made for them. Data were obtained by the use of a goal-directed data-collection process, which is described briefly. GRA

N83-11800# Stanford Univ., Calif. Center for Reliable Computing.
SOFTWARE RELATED FAILURES ON THE IBM 3081: A RELATIONSHIP WITH SYSTEM UTILIZATION
David J. Rossetti and Ravishankar K. Iyer Jun. 1982 52 p refs
(Contracts DAAG29-82-K-0105; DE-AC02-76FO-0515; ARO Proj. P-18690-EL)
(AD-A118289; CSL-TN-209; CRC-TR-82-8; ARO-18690.2-EL) Avail: NTIS HC A04/MF A01 CSCL 09/2

This paper presents an analysis of software-related system failures on the IBM 3081 at SLAC. We find three broad categories of failures: error handling, control or logic problems and hardware-related. A statistical analysis shows (not unexpectedly) a decreasing failure rate with time, this is especially true in the early part of the study. Not withstanding the decreasing failure with time, we find that the occurrence of failures is strongly correlated with the type and level of workload prior to the occurrence of a failure. For example, it is shown that the risk of a software-related failure increases in a non-linear fashion with the amount of interactive processing, as measured by paging rate and system overhead. The paper employs a statistical model to describe the load dependency and offers explanations for the observed phenomenon. Author (GRA)

N83-11801# Fondazione Ugo Bordoni, Rome (Italy).
REVIEW OF COMPUTER PROGRAMS FOR VOICE SIGNAL PROCESSING [RACCOLTA DI PROGRAMMI DI CARCOLO PER L'ELABORAZIONE DEL SEGNALE VOCALE]
Nicolo DeSario, Domenico DeSeta, Giovanni Ibba, and Andrea Paoloni Nov. 1981 84 p In ITALIAN
(FUB-23-1981) Avail: NTIS HC A05/MF A01

The computer programs developed by a research group studying speech and speaker recognition by analysis of the voice signal are reviewed. The programs include digital conversion and data acquisition, extraction of mathematical and statistical parameters, and statistical processing of those parameters. Auxiliary programs, such as coefficient calculations for FIR filters, are also presented. The graphical outputs of the main programs are illustrated. Author (ESA)

N83-11802# Boeing Computer Services, Inc., Seattle, Wash. Space and Military Application Div.

A REPORT ON A SURVEY OF VALIDATION, VERIFICATION, AND TESTING STANDARDS AND PRACTICES AT SELECTED SITES Final Report
Mark K. Smith and Donna R. Hudson Apr. 1982 135 p
(Contract NB79-SBCA-0102)
(PB82-209172; NBSIR-82-2482) Avail: NTIS HC A07/MF A01 CSCL 09B

A survey of software validation, verification and testing (V,V&T) practices at five governmental and five commercial sites was performed. Information describing each site environment, software development and maintenance practices, the V,V&T techniques and tools employed, and standards and/or procedures guiding the activities at each site was collected. The information obtained and presents observations about current operations with respect to software development, maintenance, and V,V&T is summarized. Each of the sites surveyed, and the survey instruments used are also discussed. GRA

N83-11803# Alpha Omega Group, Inc., Bowie, Md.
INTERACTIVE LANGUAGE CHARACTERISTICS (FOR A DATA DICTIONARY SYSTEM), PHASE 1 Final Report
Henry C. Leskovits Aug. 1981 9 p
(Contract NB81-SBCA-0735)
(PB82-212739; NBS-GCR-82-385) Avail: NTIS HC A02/MF A01 CSCL 09B

The functional specification for the Federal Information Processing Standard Data Dictionary System (FIPS DDS) is under development by the Institute for Computer Sciences and Technology. This paper presents some considerations concerning the interactive language of the FIPS DDS. The major recommendation is that the DDS should include a single, unified interactive command language; such features as menu selection, fill-in-blank mode and command mode, will be integrated into the language. Further recommendations are that the language should be hierarchical in structure, that commands should be structurally simple and include incremented reversibility. Author

N83-11751# North Carolina Univ., Chapel Hill.
DETECTING ERRORS IN COMPUTER PROGRAMS. AN EXPERIMENTAL COMPARISON OF METHODS
Bill Hetzel (Blue Cross and Blue Shield of Florida) and Peter Calingaert *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 14 p refs (For primary document see N83-11748 02-59)
(Grant NSF GJ-30410)
Avail: NTIS HC A14/MF A01

N83-11755# North Carolina Univ., Chapel Hill. Dept. of Computer Science.
CASE-GRAMMAR REPRESENTATION OF PROGRAMMING LANGUAGES
Judy Mallino Popelas and Peter Calingaert *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11756# South Africa Univ., Pretoria. Dept. of Computer Science and Information Systems.
THE DESIGN OBJECTIVES OF QUADLISP
Stef W. Postma *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 7 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A02/MF A01

N83-11757# South Africa Univ., Pretoria. Dept. of Computer Science.
THE PRINCIPLES OF QUADLISP
Stef W. Postma *In* CSIR Proc. of the 2nd South Africa Computer Symp. on Res. in Theory, Software and Hardware 1981 18 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11759# Council for Scientific and Industrial Research, Pretoria (South Africa).
THE DEFINITION AND IMPLEMENTATION OF THE SCRAP PROGRAMMING LANGUAGE [DIE DEFINISIE EN IMPLEMENTASIE VAN DIE TAAL SCRAP]
Martha H. VanRooyen (NNWW, Pretoria, South Africa) *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 18 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11761# Cape Town Univ. (South Africa).
A CSP DESCRIPTION OF SOME PARALLEL SORTING ALGORITHMS
M. H. Linck *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11762# Cape Town Univ. (South Africa).
DATA STRUCTURE TRACES
S. R. Schach *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11764# Council for Scientific and Industrial Research, Pretoria (South Africa).
ASPECTS OF A COMPUTER-AIDED DESIGN AND FINITE-ELEMENT SIMULATION BY SMALL COMPUTERS [ASPEKTE VAN REKENAAR-ONDERSTEUNDE ONTWERP EN EINDIGE-ELEMNTSIMMULASIE OP TAFELREDENAARS]
F. J. DeWet (Rekor, Edms, Bpk., Pretoria) *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 10 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11768# Cape Town Univ. (South Africa). Dept. of Computer Science.
THE ANALYSIS OF CODE GENERATION ALGORITHMS FOR THE UNIVAC 1100 COMPUTER
C. Block and K. J. MacGregor *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 1 p (For primary document see N83-11748 02-60)
Avail: NTIS HC A14/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N83-11804*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IPAD: INTEGRATED PROGRAMS FOR AEROSPACE-VEHICLE DESIGN
Sep. 1980 400 p refs Proc. of a Natl. Symp. held at Denver, 17-19 Sep. 1980; sponsored by Boeing Commercial Aircraft Co. (NASA-CP-2143; L-13916; NAS 1.55:2143) Avail: NTIS HC A17/MF A01 CSCL 09B

The conference was organized to promote wider awareness of the IPAD program and its coming impact on American industry. The program focuses on technology issues that are critical to computer-aided design and manufacturing. Included is a description of a representative aerospace design process and its interface with manufacturing, the design of a future IPAD integrated computer-aided design system, results to date in developing IPAD products and associated technology, and industry experiences and plans to exploit these products. Author

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-11805# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

CONSULTATION SYSTEM WITH KNOWLEDGE REPRESENTATION BY DECISION RULES [SISTEMA DE CONSULTA COM REPRESENTACAO DE CONHECIMENTO POR REGRAS DE DECISAO]

Edson Luiz Franca Senne and Paulo Ouvera Simoni Apr. 1982 15 p refs In PORTUGUESE; ENGLISH summary Presented at the 9th Integrated Seminar on Software and Hardware (SEMISH), Ouro Preto, Brazil, 12-17 Jul. 1982

(INPE-2378-PRE/103) Avail: NTIS HC A02/MF A01

The use of decision rules in the representation of empirical knowledge supplied by application domain experts is discussed. Based on this representation, a system is described which employs artificial intelligence techniques to yield inferences within a specific domain. Three modules composing the system are described: the acquisition one, that allows the insertion of new rules; the diagnostic one, that uses rules in the inference process; and the explanation one, that exhibits reasons for each system action. M.G.

N83-11806*# Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.

SPACE APPLICATIONS OF AUTOMATION, ROBOTICS AND MACHINE INTELLIGENCE SYSTEMS (ARAMIS). VOLUME 4: SUPPLEMENT, APPENDIX 4.3: CANDIDATE ARAMIS CAPABILITIES Final Report

Rene H. Miller, Marvin L. Minsky, and David B. S. Smith Aug. 1982 564 p refs Supplement to SSL-24-82-Vol-4

(Contract NAS8-34381)

(NASA-CR-162083; NAS 1.26:162083; SSL-24-82-Vol-4-Suppl-App-4.3) Avail: NTIS HC A24/MF A01 CSCL 09B

Potential applications of automation, robotics, and machine intelligence systems (ARAMIS) to space activities, and to their related ground support functions, in the years 1985-2000, so that NASA may make informed decisions on which aspects of ARAMIS to develop. The study first identifies the specific tasks which will be required by future space projects. It then defines ARAMIS options which are candidates for those space project tasks, and evaluates the relative merits of these options. Finally, the study identifies promising applications of ARAMIS, and recommends specific areas for further research. The ARAMIS options defined and researched by the study group span the range from fully human to fully machine, including a number of intermediate options (e.g., humans assisted by computers, and various levels of teleoperation). By including this spectrum, the study searches for the optimum mix of humans and machines for space project tasks. Author

N83-11807*# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.

CONIC SECTOR ANALYSIS OF HYBRID CONTROL SYSTEMS Ph.D. Thesis

Peter Murray Thompson Sep. 1982 268 p refs Sponsored in part by General Electric Corp.

(Grant NGL-22-009-124)

(NASA-CR-169455; NAS 1.26:169455; LDS-TH-1242) Avail: NTIS HC A12/MF A01 CSCL 09B

A hybrid control system contains an analog plant and a hybrid (or sampled-data) compensator. In this thesis a new conic sector is determined which is constructive and can be used to: (1) determine closed loop stability, (2) analyze robustness with respect to modelling uncertainties, (3) analyze steady state response to commands, and (4) select the sample rate. The use of conic sectors allows the designer to treat hybrid control systems as though they were analog control systems. The center of the conic sector can be used as a rigorous linear time invariant approximation of the hybrid control system, and the radius places a bound on the errors of this approximation. The hybrid feedback system can be multivariable, and the sampler is assumed to be synchronous. Algorithms to compute the conic sector are presented. Several examples demonstrate how the conic sector analysis techniques are applied. Extensions to single loop multirate hybrid feedback systems are presented. Further extensions are proposed for multiloop multirate hybrid feedback system and for single rate systems with asynchronous sampling. Author

N83-11808# SRI International Corp., Menlo Park, Calif.

R AND D PLAN FOR ARMY APPLICATIONS OF AI/ROBOTICS Final Report

David R. Brown, Darrell V. Fowler, David J. Frie, William M. Hadly, Joan C. Introne, William T. Park, Ann E. Robinson, and William Schubert May 1982 319 p refs

(Contract DAAK70-81-C-0250; SRI Proj. 3736)

(AD-A118297; ETL-0296) Avail: NTIS HC A14/MF A01 CSCL 06/4

One hundred applications of artificial-intelligence technology and robotics in Army combat and combat support that may be possible and worthwhile are identified. These possible applications have been divided into ten categories, and one example in each category has been examined in detail. Research and development plans have been developed showing the basic and applied research that would be needed to make the applications possible. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-11809# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

TIME-VARYING SYSTEMS IN A CATEGORY, A DUALITY THEORY

Cornelia G. Nolte Feb. 1982 21 p refs

(CSIR-TWISK-243) Avail: NTIS HC A02/MF A01

The duality theory between the reachability and observability of adjoint systems, developed in a previous paper, (Nolte and Naude, 1981), is extended to the time-varying case by using the Arbib-Manes construction of a time varying system in a category. The theory includes new results for non-linear time-varying systems, such as bilinear and polynomial systems. Author

N83-11810# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

DUALITY BETWEEN REACHABILITY AND OBSERVABILITY FOR ADJOINT SYSTEMS

C. G. Nolte and G. Naude Feb. 1982 24 p refs

(CSIR-TWISK-244) Avail: NTIS HC A02/MF A01

The Kalman duality between the reachability and observability of finite-dimensional linear systems is generalized to adjoint systems (in the sense of Arbib-Manes). The theory includes previous results on infinite-dimensional linear systems and linear systems over rings, and yields new results for classes of nonlinear systems such as bilinear and polynomial systems. Author

N83-11811# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ANALYSIS OF SOME HEURISTIC PROCEDURES FOR UNCAPACITATED DYNAMIC LOT SIZE PROBLEMS [ANALISE DE ALGUNS PROCEDIMENTOS HEURISTICOS PARA PROBLEMAS DE TAMANHO DE LOTE NAO-CAPACITADO]

Gabriel R. Bitran, Thomas L. Magnanti, and Horatio H. Yanasse Jun. 1982 17 p refs In PORTUGUESE; ENGLISH summary Presented at the 15th Brazilian Symp. on Operations Res. and the 1st Latin American Congr. on Operations Res. and Systems Eng., Rio de Janeiro, Nov. 1982

(INPE-2423-PRE/130) Avail: NTIS HC A02/MF A01

Approximations used to solve the dynamic lot size problem

are analyzed. The effect of partitioning the planning horizon and an aggregation procedure based on the proportionality of the parameters of the products are discussed. Worst case error bounds for the heuristics known as Silver and Meal, part period balancing, economic order quantity (expressed in terms of time supply) and two other procedures are provided. Author

N83-11812# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
ON THE WALACH-ZEBEN MULTIVARIABLE POSITIVITY TEST
D. H. Martin Nov. 1981 17 p refs
(CSIR-TWISK-236) Avail: NTIS HC A02/MF A01

A test for the positivity of real multivariable polynomials on box domains is discussed. The case of unbounded domains is examined. The restriction to box domains is dispensed with entirely. A treatment which extends the scope of the test is prevented. The case of unbounded domains is clarified. It is shown that the test actually tests for strong positivity, i.e., for the existence of positive lower bounds. Author

N83-11813# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
ON THE EXPRESSION OF EXTERIOR NEUMANN PROBLEMS WITH INFINITE BOUNDARIES AS A LIMIT OF PROBLEMS WITH FINITE BOUNDARIES
Ronald I. Becker (Cape Town Univ.) and Ronald New (Cape Town Univ.) Dec. 1981 26 p refs
(CSIR-TWISK-240) Avail: NTIS HC A03/MF A01

It is proved that the solutions of Neumann problems for the exterior of spheres [(x sub 1 + b)(2) + (x sub 2)(2) + (x sub 3)(2) = b(2) where x is contained in a Euclidean three-dimensional space, R(3)] converge to the solution of the exterior problem for the half-space x sub 1 > or = 0 provided that the boundary ata converge in a certain sense. The method requires that there be some dissipation, which can be arbitrarily small. Fredholm integral equations are set up for the boundary data, and these are solved for large b by means of Neumann series. Convergence is proved by making use of estimates, in terms of b, of the terms of the series (which involve singular integrals). The procedure of expressing problems with infinite boundaries as a limit of problems with finite boundaries makes it possible to implement an effective numerical procedure for determining, for example, the entire near-field of a baffled piston. M.G.

N83-11814# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
THE ALGEBRAIC UNIQUENESS OF THE ADDITION OF NATURAL NUMBERS
Elemer E. Rosinger Nov. 1981 9 p ref
(CSIR-TWISK-239) Avail: NTIS HC A02/MF A01

As is known within the natural numbers, multiplication is an iteration of addition. It is shown that addition is essentially the only associative binary operation on natural numbers whose iteration is commutative or associative. M.G.

N83-11815# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
AN ALTERNATIVE APPROACH TO NONLINEAR FILTERING: MAXIMIZING THE PROBABILITY OF HITTING A TARGET SET
Y. Yavin Dec. 1981 25 p refs
(CSIR-TWISK-238) Avail: NTIS HC A02/MF A01

A nonlinear filtering problem is discussed. Sufficient conditions on weak optimal gain matrices are derived, and as these conditions are given by a set of two coupled nonlinear partial differential equations in which the coupling constitutes a very complicated optimization problem, a procedure is suggested for computing weak suboptimal gain matrices, and these are computed for a variety of cases. Author

N83-11816# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
SOME CONSTRUCTIVE ASPECTS OF THE THEORY OF HYPERBOLIC EQUATIONS
T. Geveci Nov. 1981 29 p refs Presented at the Ann. Congr. of the South Africa Math. Soc., Port Elizabeth, South Africa, Oct. 1981
(CSIR-TWISK-241) Avail: NTIS HC A03/MF A01

The relative significance of the stability of difference schemes that are consistent with a hyperbolic differential equation is examined within the context of various L(p) spaces. The usefulness of identifying 'modified equations' which model the behavior of the difference schemes better than the original equation, even in the case of non-smooth data is also discussed. A scalar conservation law is singled out to emphasize the importance of establishing a meaningful extension of the notion of stability to the nonlinear case. M.G.

N83-11817# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS, VOLUME 2
D. P. Laurie, ed. Jan. 1982 197 p refs Proc. of NRIMS Summer Seminar Ser., 8-10 Feb. 1982
(CSIR-TWISK-246) Avail: NTIS HC A09/MF A01

Solution methods for various kinds of partial differential equations are discussed. In particular, direct, iterative, and conjugate gradient methods for solving large systems of linear equations are described. A fast convergent numerical method is presented for solving nonlinear systems of evolution equations. Problems in numerical weather predictin and ocean modelling, and conservation laws in fluid dynamics are also covered. Finally, the use of finite element partitioning for the integration of transient problems is discussed. M.G.

N83-11818# Naval Underwater Systems Center, New London, Conn.
ORING LOSS DATA FOR SQUARE LAW DETECTORS FOLLOWING BY AN ORING DEVICE AND AN ACCUMULATOR
William A. Struzinski 28 Jul. 1982 31 p refs
(AD-A118386; NUSC-TR-6731) Avail: NTIS HC A03/MF A01 CSCL 12/1

A mathematical model is developed to compute the ORing loss for square law detectors followed by an ORing device and an accumulator. The ORing loss is computed using Gaussian and Chi-square statistics for a detection probability of 0.5 and false alarm probabilities of 0.01, 0.001, 0.000,1, and 0.000,001. The ORing loss is computed as a function of the number of channels ORed and the number of samples in the accumulator. It is concluded that there will be a large signal-to-noise ratio loss if integration is performed following ORing. Author (GRA)

N83-11819# Illinois Univ., Chicago. Dept. of Mathematics.
ON SEGMENTATION OF TIME SERIES AND IMAGES IN THE SIGNAL DETECTION AND REMOTE SENSING CONTEXTS
1 Aug. 1982 22 p refs Presented at the Workshop on Signal Processing in the Ocean Environ., Annapolis, Md., 11-14 May 1982
(Contract N00014-80-C-0408)
(AD-A118344; TR-82-4) Avail: NTIS HC A02/MF A01 CSCL 12/1

The problem of partitioning a time-series into segments is considered. The segments fall into classes, which may correspond to phases of a cycle (recession, recovery, expansion in the business cycle) or to portions of a signal obtained by scanning (background/clutter, target, background/clutter again, another target, etc.), or normal tissue, tumor, normal tissue in medical applications. A probability distribution is associated with each class of segment. Parametric families of distributions are considered, a set of parameter values being associated with each class. With each observation is associated an unobservable label, indicating from which class the observation arose. The label process is modeled as a Markov chain. Segmentation algorithms are obtained by applying a method of iterated maximum likelihood to the resulting likelihood function. In this paper special attention is given to the situation in which the observations are conditionally independent, given the labels. A numerical example is given. Choice of the

number of classes, using Akaike's information criterion (AIC) for model identification, is illustrated. Similar ideas are applied to the problem of segmenting digital images, where possible applications include SEASAT (and LANDSAT) multi-spectral images.
Author (GRA)

N83-11820# SRI International Corp., Menlo Park, Calif. Computer Science Lab.
THE IMPLICATIONS OF INTERACTIVE CONSISTENCY FOR FAULT-TOLERANT COMPUTATIONS Final Report
Marshall C. Pease Jul. 1982 19 p refs
(Contract DAAK29-79-C-0102; SRI Proj. 8492)
(AD-A118111; ARO-16313.2-EL) Avail: NTIS HC A02/MF A01 CSCL 12/1

The program examined the significance of interactive consistency for battlefield communications. This environment is different from those considered in the original work on interactive consistency in three ways: the network is apt to be very large; it is incomplete in the sense that a particular node will not be able to communicate directly with every other one; and it is variable in unpredictable ways as links fade out or become useful. Recent work on interactive consistency is reviewed for its relevance to an environment with these characteristics. Recent work has demonstrated that, in incomplete networks, the network connectivity is critical. Specifically, in a network with N nodes of which not more than N may be faulty, interactive consistency can be assured if N is greater than 3M and the network connectivity is greater than 2M. Given the variability of the networks being considered, this makes it vital that we have a way for determining network connectivity. Two distributed algorithms for determining network connectivity have been developed. GRA

N83-11821# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
A GRAPHICAL TEST BED FOR ANALYZING AND REPORTING THE RESULTS OF A SIMULATION EXPERIMENT M.S. Thesis
David George Linnebur Mar. 1982 113 p refs
(AD-A118214) Avail: NTIS HC A06/MF A01 CSCL 12/1

A graphical test bed in which the results of a simulation experiment can be reported and analyzed is described. The test bed is based on the regression adjusted graphics and estimation (RAGE) methodology developed by Heidelberger and Lewis for regenerative simulations. From the graphics and the associated numerics the experimenter can summarize and see simultaneously relative properties, such as bias, normality and standard deviation, of several estimators of a characteristic of a population for up to eight sample sizes. The graphics is supported on a line printer to make it and the program portable. Author (GRA)

N83-11822# Naval Postgraduate School, Monterey, Calif.
AN APPLICATION OF RAYLEIGH CURVE THEORY TO CONTRACT COST ESTIMATES AND CONTROL M.S. Thesis
Harry Watkins, III Mar. 1982 84 p refs
(AD-A118213) Avail: NTIS HC A05/MF A01 CSCL 15/5

Cost growth is a major problem in defense systems acquisition. Since 1969 the DOD has underestimated ultimate costs of major systems by more than 50 percent. Consequently, the importance of contract costs has risen greatly in recent years to the point that costs are now officially equated to technical performance in importance. A body of knowledge of the structure and models of the behavior of contract costs and contract performance within DOD is desired. This paper develops a simplified methodology for the systematic analysis and prediction of cost and schedule variables from an existing data base. The methodology is applied to actual DOD contract data using the interactive computing system MINITAB. Author (GRA)

N83-11823# National Defence Academy, Tokyo (Japan).
SOLID BODY EQUATIONS TO CALCULATE THE TRAJECTORY OF RAMJET
Kenji Imai Naval Postgraduate School Apr. 1982 25 p refs
(Contract N62271-82-M-1221; DARPA Order 4035)
(AD-A118241; NPS67-82-001CR) Avail: NTIS HC A02/MF A01 CSCL 19/1

Six-degree-of-freedom trajectory equations for a ramjet propelled, gun launched projectile are formulated. An outline for FORTRAN computer program flow charts also appears in the report. Special emphasis is given to the effect of wind on trajectory errors.
Author (GRA)

N83-11824# George Washington Univ., Washington, D.C. Program in Logistics.
CLASSICAL AND BAYESIAN APPROACHES TO THE CHANGE-POINT PROBLEM: FIXED SAMPLE AND SEQUENTIAL PROCEDURES
S. Zacks 15 May 1982 49 p refs Presented at Meeting of French Statist. Soc., Journees de Statist., Brussels, 24-28 May 1982
(Contracts N00014-75-C-0725; N00014-81-K-0407; N00014-75-C-0729)
(AD-A118048; Serial-T-465) Avail: NTIS HC A03/MF A01 CSCL 12/1

The change-point problem can be considered one of the central problems of statistical inference, linking together statistical control theory, theory of estimation and testing hypotheses, classical and Bayesian approaches, fixed sample and sequential procedures. It is very often the case that observations are taken sequentially over time, or can be intrinsically ordered in some other fashion. The basic question is, therefore, whether the observations represent independent and identically distributed random variables, or whether at least one change in the distribution law has taken place. This is the fundamental problem in the statistical control theory, testing the stationarity of stochastic processes, estimation of the current position of a time-series, etc. Accordingly, a survey of all the major developments in statistical theory and methodology connected with the very general outlook of the change-point problem, would require review of the field of statistical quality control, the switching regression problems, inventory and queueing control, etc. The present review paper is therefore focused on methods developed during the last two decades for the estimation of the current position of the mean function of a sequence of random variables (or of a stochastic process); testing the null hypothesis of no change among given n observations, against the alternative of at most one change; the estimation of the location of the change-point(s) and some sequential detection procedures.
GRA

N83-11825# Naval Underwater Systems Center, New London, Conn. Submarine Sonar Dept.
EQUIVALENT BANDWIDTH OF A GENERAL CLASS OF POLYNOMIAL SMOOTHERS: WITH APPLICATION TO BEARING TRACKER RANDOM ERROR EVALUATION
Robert A. LaTourette and Lawrence C. Ng 19 Jul. 1982 83 p refs
(AD-A117996; NUSC-TR-6601) Avail: NTIS HC A05/MF A01 CSCL 12/1

Random bearing error is a major performance measure of a sonar bearing tracker. Programs currently employed in calculating random bearing error from measured tracker bearing error data use a standard polynomial Least Mean Square Fit (LMSF) algorithm to remove an unknown time varying mean. Previously, the effect of the LMSF algorithm on the residuals of the measured tracker bearing error data was not fully accounted for. In addition, when processing correlated bearing error residuals, the optimum choice of the order of the LMSF and appropriate bias correction factor as a function of signal-to-noise ratio (SNR) were not known. This study investigates the properties of the LMSF in detail and shows that the LMSF behaves as a low-pass filter, the frequency response characteristics of which can be calculated exactly. The equivalent noise bandwidth of the LMSF is shown to be a function of the sample size, the sampling time and the order of the fit. The appropriate bias correction factor, when processing correlated data, is shown to be determined by the ratio of the LMSF bandwidth to the equivalent tracker bandwidth. Results of the analysis are verified by extensive simulation. Finally, an operational procedure

is given to obtain an unbiased estimate of the variance for at-sea measured tracker data. Author (GRA)

N83-11826# George Washington Univ., Washington, D.C. Program in Logistics.
OPTIMAL VALUE BOUNDS AND POSYNOMIAL GEOMETRIC PROGRAMS
Jerzy Kyparisis 30 Apr. 1982 39 p refs
(Contract N00014-75-C-0729; Grant NSF ECS-81-14555)
(AD-A117994; Serial-T-464) Avail: NTIS HC A03/MF A01 CSCL 12/1

The idea of bounds on the optimal value of a geometric programming problem has been present since the inception of geometric programming (Duffin, Peterson, and Zener), and has proved to be fruitful in applications of GP. The bounds are the immediate consequences of GP duality theory. Recently, this idea has been extended to parametric bounds on the optimal value function f*. Woolsey and Dembo derive a lower bound on f* using the known fact that the dual objective function at a fixed dual-feasible point underestimates f* for all values of certain coefficients (parameters). Fiacco proposed a general approach for calculating upper and lower bounds on f* (particularly simple whenever f* is convex or concave), which utilizes sensitivity information as well as Wolfe's duality theory. This paper is based on similar ideas, except that GP duality theory is used instead of Wolfe's duality and the special structure of GP primal and dual problems is exploited. Several classes of perturbed GP problems are shown to possess convex or concave f*, or at least 'tight' overestimating and underestimating problems with convex or concave optimal values. Author (GRA)

N83-11827# California Univ., Berkeley. Center for Pure and Applied Mathematics.
THE LANCZOS ALGORITHM FOR SOLVING SYMMETRIC LINEAR SYSTEMS Final Report
Horst D. Simon 20 Apr. 1982 109 p refs
(Contract N00014-76-C-0013)
(AD-A118014; PAM-74) Avail: NTIS HC A06/MF A01 CSCL 12/1

The Lanczos Algorithm is becoming accepted as a powerful tool for finding the eigenvalues and eigenvectors of large sparse matrices. This dissertation considers the application of the Lanczos algorithm to the solution of large sparse symmetric systems of linear equations. We analyze the symmetric Lanczos process with various reorthogonalization methods, and present a new implementation of the algorithm, which efficiently maintains orthogonality among the Lanczos vectors. This new algorithm is discussed in detail, compared to other methods, and tested with some numerical examples. Author (GRA)

N83-11828# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
GALERKIN METHODS FOR SINGULAR BOUNDARY VALUE PROBLEMS IN ONE SPACE DIMENSION
Kenneth Eriksson and Vidar Thomee 1982 41 p refs
(CTH-Math-1982-11) Avail: NTIS HC A03/MF A01

Two Galerkin type piecewise polynomial approximation procedures, based on bilinear forms with different weight functions, are analyzed and compared. Optimal order error estimates are proved and numerical results are presented. Author (ESA)

N83-11829# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
A NUMERICAL METHOD TO COMPUTE AN ALMOST BEST CHEBYSHEV SPLINE APPROXIMATION TO DISCRETE DATA
J. J. Renes 1 Apr. 1981 20 p refs
(Contract NIVR-1898)
(NLR-TR-81045-U) Avail: NTIS HC A02/MF A01

An iterative method is presented, without a convergence proof, of computing an almost best spline approximation in the Chebyshev sense to discrete data. The approximation meets user-specified tolerances and can satisfy side conditions.
Author (ESA)

N83-11043# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ASYMPTOTIC STABILITY OF PARTIALLY DAMPED MECHANICAL SYSTEMS
Gao Weibin *In its* J. of Aeron. (FTD-ID(RS)T-0621-82) 21 Jul. 1982 p 96-108 refs Transl. into ENGLISH from Acta Aeron. et Astron. Sinica (China), v. 3, no. 1, Mar. 1982 (For primary document see N83-11035 02-01)
Avail: NTIS HC A08/MF A01 CSCL 12/1

N83-11758# South Africa Univ., Pretoria. Dept. of Computer Science.
MENGER'S THEOREM IN A NEBULA
H. O. VanRooyen *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-11830# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
THE USE OF RECURSIVE RESIDUALS IN CHECKING MODEL FIT IN LINEAR REGRESSION
Jacqueline S. Galpin and Douglas M. Hawkins Nov. 1981 40 p refs
(CSIR-TWISK-226) Avail: NTIS HC A03/MF A01

It is noted that recursive residuals are independently and identically distributed, and may be interpreted as showing the effect of successively deleting observations from the data set. The use of the normal probability plot and the cumulative sum plots of the recursive residuals, and of the square roots of the absolute values of the recursive residuals to check the model assumptions of normality and other aspects of model misfits such as change of regime, outliers, and omitted predictors is proposed. M.G.

N83-11831# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
RECENT RESULTS ON MULTI-STAGE SELECTION PROCEDURES
Klaus J. Miescke Jul. 1982 21 p refs
(Contract N00014-75-C-0455)
(AD-A118374; TR-82-25) Avail: NTIS HC A02/MF A01 CSCL 12/1

The purpose of the present paper is to describe the major results and to point out some open problems and interesting questions for further research. The basic goal is to find that one of k populations which is associated with the largest parameter of a given underlying family of distributions. Additionally, in the control setting, one wishes to decide whether this parameter is large enough, i.e., larger than a control value. A major topic of interest is to find procedures which are reasonably economical, i.e., which perform well without requiring too many observations. The traditional criterion, due to R.E. Bechhofer, which is to guarantee the probability of a correct selection outside of a certain indifference zone, combined with the criterion of keeping the expected total sampling amount small, constitutes the main stream of current research. On the other hand, some work has also been done in the decision theoretic approach, but due to the inherent analytical difficulties, the results are rather incomplete up to now. Author

N83-11832# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
A STUDY OF FOUTZ'S MULTIVARIATE GOODNESS-OF-FIT TEST M.S. Thesis
Richard John Linhart, Jr. Mar. 1982 58 p refs
(AD-A118198) Avail: NTIS HC A04/MF A01 CSCL 12/1

The empirical power of a new multivariate goodness-of-fit test proposed by Foutz (1980) is investigated. The test has been applied to Monte Carlo samples from bivariate and trivariate normal

distributions with a variety of mean vectors and covariance matrices. The null hyposthesis tested is that the sample is from a multi-variate normal distribution with 0 mean vector and covariance matrix the identity I. Author (GRA)

N83-11833# Fondazione Ugo Bordoni, Rome (Italy).
A NEW METHODOLOGY FOR THE PREDICTION OF RAIN INDUCED ATTENUATION [STUDIO DI UNA NUOVA METODOLOGIA PER LA PREVISIONE DELL'ATTENUAZIONE DOVUTA A PIOGGIA]
Aldo Paraboni (Politech. di Milan) Dec. 1981 49 p refs In ITALIAN
(FUB-38-1981) Avail: NTIS HC A03/MF A01

The analysis of the 'modal method' for rain attenuation prediction is extended. This method establishes a linear transformation between the attenuation probability distribution and the rain intensity probability distribution. The functional characteristics of the transformation are discussed. The physical models and the corresponding characteristic functions are examined. Solutions, using numerical and analytical techniques, are presented. The strategy to face the limited data availability on both probability distributions is examined. Measured data and data derived from various physical models are compared. Author (ESA)

N83-11763# Sperry Univac, Johannesburg (South Africa).
THE OPERATIONAL SINGLE SERVER MODEL [DIE OPERSIONELE ENKELBEDIENRMODEL]
J. C. VanNiekerk *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 13 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N83-11834# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PETRI NETS AND THE ANALYSIS OF CONCURRENT SYSTEMS [REDES DE PETRI E A ANALISE DE SISTEMAS CONCORRENTES]
Ricardo C. O. Martins May 1982 19 p refs In PORTUGUESE; ENGLISH summary Presented at the 9th SEMISH Conf.
(INPE-2394-PRE/111) Avail: NTIS HC A02/MF A01

Formal parameters are proposed for the analysis of the behavior and the concurrency of activities in systems modeled by Petri nets. Formalism is based on two fundamental properties of Petri nets, namely, conflict and independence of the firing of the transitions. The results obtained with such a formalism are also summarized. Author

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N83-11835# Naval Postgraduate School, Monterey, Calif.
FRICTION MEASUREMENT BY MEANS OF A GYROSCOPE MASS M.S. Thesis
Thomas Leo Stowell Mar. 1982 50 p refs
(AD-A118188) Avail: NTIS HC A03/MF A01 CSCL 19/4

Previous theoretical and experimental studies have demonstrated that when a bored sphere is contained within a spinning cavity, the sphere will rotate so that its major axis of inertia is aligned with the axis of spin of the cavity. Under certain conditions, the time required for alignment is inversely proportional to the coefficient of sliding friction. The objective of this investigation has been to investigate this phenomenon as a method for determination of the coefficient of sliding friction between various materials. An experimental apparatus was designed and built and tests were conducted in order to evaluate the basic theoretical premise. Author (GRA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N83-11836# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SOUND PROPAGATION CONDITIONS ON THE SOUTHEAST COAST OF BRAZIL [CONDICOES DE PROPAGACAO DO SOM NA COSTA SUDESTE DO BRASIL]
Jose Luiz Stech Apr. 1982 20 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Naval Symp. on Sonar, Rio de Janeiro, 14-17 Apr. 1982
(INPE-2374-PRE/100) Avail: NTIS HC A02/MF A01

The sound speed in a water column was determined by utilizing Wilson's formula, with data of temperature, salinity and pressure. In the second part, Geometric Acoustic Techniques were used to determine two regions where the sound wave ranges were largest; those larger ranges occurred in July and November. It was also possible to obtain several shadow zones in the studied area. Author

N83-11837# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STATISTICAL ESTIMATION OF SOUND PROPAGATION IN THE COASTAL REGION OF CABO FRIO USING THE TECHNIQUES OF GEOMETRICAL ACOUSTICS [AVALIACAO ESTATISTICA DA PROPAGACAO DO SOM NA REGIAO COSTEIRA DE CABO FRIO, ULTIZANDO-SE AS TECNICAS DE ACUSTICA GEOMETRICA]
Jose Luiz Stech Apr. 1982 41 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Naval Sonar Symp., Arraial do Cabo, R. J., Brazil, 14-17 Apr. 1982
(INPE-2375-PHE/101) Avail: NTIS HC A03/MF A01

The sound propagation in the coastal region near Cabo Frio was studied. Wilson's formula and the geometric acoustic techniques were used. Data from the Brazilian Navy Hydrographic Service Oceanographic Center (DHN) were utilized. These data were processed through a computer program. Through this program the mean, maximum and minimum values for temperature and the mean values for salinity, interpolated every 10 meters from the surface to the depth of 100 meters, were obtained. The mean, maximum and minimum profiles of sound speed were obtained. Then the ray diagrams were done, simulating a sound source located at 10 m depth with the sound rays varying from one to ten degrees with respect to a horizontal line. R.J.F.

N83-11838*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NEW MEASUREMENT METHOD FOR SEPARATING AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY AIRCRAFT TYPE PANELS
Michael C. McGary Sep. 1982 33 p refs
(NASA-TP-2079; L-15481; NAS 1.60:2079) Avail: NTIS HC A03/MF A01 CSCL 20A

The theoretical basis for and experimental validation of a

measurement method for separating airborne and structure borne noise radiated by aircraft type panels are presented. An extension of the two microphone, cross spectral, acoustic intensity method combined with existing theory of sound radiation of thin shell structures of various designs, is restricted to the frequency range below the coincidence frequency of the structure. Consequently, the method lends itself to low frequency noise problems such as propeller harmonics. Both an aluminum sheet and two built up aircraft panel designs (two aluminum panels with frames and stringers) with and without added damping were measured. Results indicate that the method is quick, reliable, inexpensive, and can be applied to thin shell structures of various designs. A.R.H.

N83-11839*# Wyle Labs., Inc., El Segundo, Calif.
LABORATORY STUDIES OF SCALES FOR MEASURING HELICOPTER NOISE Final Report
J. B. Ollerhead Washington NASA Nov. 1982 123 p refs
(Contract NAS1-16276)
(NASA-CR-3610; NAS 1.26:3610; WR82-12) Avail: NTIS HC A06/MF A01 CSCL 20A

The adequacy of the effective perceived noise level (EPNL) procedure for rating helicopter noise annoyance was investigated. Recordings of 89 helicopters and 30 fixed wing aircraft (CTOL) flyover sounds were rated with respect to annoyance by groups of approximately 40 subjects. The average annoyance scores were transformed to annoyance levels defined as the equally annoying sound levels of a fixed reference sound. The sound levels of the test sounds were measured on various scales, with and without corrections for duration, tones, and impulsiveness. On average, the helicopter sounds were judged equally annoying to CTOL sounds when their duration corrected levels are approximately 2 dB higher. Multiple regression analysis indicated that, provided the helicopter/CTOL difference of about 2 dB is taken into account, the particular linear combination of level, duration, and tone corrections inherent in EPNL is close to optimum. The results reveal no general requirement for special EPNL correction terms to penalize helicopter sounds which are particularly impulsive; impulsiveness causes spectral and temporal changes which themselves adequately amplify conventionally measured sound levels. Author

N83-11840*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NOISE OF THE 10-BLADED, 40 DEG SWEPT SR-6 PROPELLER IN A WIND TUNNEL
James H. Dittmar, George L. Stefko, and Robert J. Jeracki Sep. 1982 46 p refs
(NASA-TM-82950; E-1357; NAS 1.15:82950) Avail: NTIS HC A03/MF A01 CSCL 20A

The noise generated by supersonic helical-tip-speed propellers is a likely cabin environment problem for future airplanes powered by these propellers. Three propeller models with different tip sweeps. SR-1M, SR-2, and SR-3, designed for 244 m/sec (800 ft/sec) tip speed at a flight Mach number of 0.8 were previously tested in the NASA Lewis 8- by 6-Foot Wind Tunnel. In order to investigated another design point condition, the SR-6 propeller was designed for 213 m-sec (700 ft/sec) tip speed at a flight Mach number of 0.8. The noise data from this propeller are reported hereinn. Curves of blade passing frequency noise versus tip Mach number (at constant advance ratio) showed that the SR-6 propeller behaved similarly to the SR-1M propeller. The noise of the SR-6 propeller at its design condition, helical tip Mach number of 1.07, is approximately 3 dB quieter than the SR-2 propeller at its higher design helical tip Mach number of 1.15, but about 2.5 dB noisier than SR-3 at its design condition. The helical tip Mach number shift of the steep noise rise followed the same progression as the blade sweep angle for all of the propellers. When operated at the SR-3 design point, the SR-6 propeller was approximately 1.5 dB quieter than SR-2 and 4 dB noisier than SR-3. Author

N83-11841# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Environment Branch.
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 166: AF/M32T-1 TESTER, PRESSURIZED CABIN LEAKAGE, AIRCRAFT
Thomas H. Rau Jul. 1982 52 p
(AF Proj. 7231)
(AD-A117950; AMRL-TR-75-50-Vol-166) Avail: NTIS HC A04/MF A01 CSCL 01/2

Measured and extrapolated data define the bioacoustic environments produced by a gasoline engine driven cabin leakage tester operating outdoors on a concrete apron at normal rated conditions. Near field data are presented for 37 locations at a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 36 locations are normalized to standard meteorological conditions and extrapolated from 10 - 1600 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distance from the source. Author (GRA)

N83-11842# Pennsylvania State Univ., State College. Applied Research Lab.
DISCRETE FREQUENCY NOISE AND ITS REDUCTION IN SMALL AXIAL-FLOW FANS
James Michael Fitzgerald 2 Mar. 1982 147 p refs
(Contract N00024-79-C-6043)
(AD-A118439; ARL/PSU/TM-82-76) Avail: NTIS HC A07/MF A01 CSCL 13/1

The discrete frequency noise radiated from representative types of axial-flow fans used in electronic equipment is studied in detail. Narrowband analysis of the discrete frequency noise radiated by these types of fans has been conducted in a free-field environment. The far-field sound pressure level, radiated directivity, and total radiated power of the discrete frequency noise is presented. The influence of operating point on the sound radiated from the fans is determined. The discrete frequency noise dominates the characteristic acoustic spectra at high flow coefficients.
Author (GRA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-11843# Mission Research Corp., Albuquerque, N. Mex.
IMPROVED TREATMENT OF MULTIPLE SCATTERING OF INTENSE CHARGED PARTICLE BEAMS Interim Report
T. P. Hughes and B. B. Godfrey Jul. 1982 31 p refs
(Contract N60921-82-C-0004; ARPA Order 4395)
(AD-A118299; AMRC-R-389) Avail: NTIS HC A03/MF A01 CSCL 20/8

The scattering of self-pinched particle beams propagating in gas is investigated using Moliere's treatment of multiple scattering. Nordsieck lengths significantly longer than those predicted on the basis of less accurate scattering formalisms are obtained numerically. An improved analytic-expression for the Nordsieck length is derived and agrees well with the numerical results. Experimental data on the beam expansion from the PHERMEX and ASTRON experiments show good agreement with numerical simulations and analytic results. GRA

N83-11844# Rutherford High Energy Lab., Chilton (England).
ELECTRON EXCITATION IN ATOMS AND MOLECULES BY NEUTRON-NUCLEUS SCATTERING
S. W. Lovesey, C. D. Bowman, and R. G. Johnson Mar. 1982 19 p refs Prepared in cooperation with NBS, Washington
(PB82-208463; RL-82-016) Avail: NTIS HC A02/MF A01 CSCL 07D

The electronic excitation of atoms and diatomic molecules arising from neutron-nucleus scattering is examined. Both center-of-mass recoil and the coupling between electrons and nuclei arising

from nonadiabatic terms neglected in the Born-Oppenheimer approximation are considered. A significant cross section from center-of-mass recoil is predicted for single atoms for sufficiently large changes in the wavevector of the neutron. The nonadiabatic terms give rise to small cross sections for molecules unless the spacing of the electronic states is comparable with the rotational energy constant, which is possible for transition between excited states. M.G.

N83-11845# Science Research Council, Chilton (England).
DECAYS OF HEAVY QUARK SYSTEMS: EFFECTS OF GLUON CONDENSATE
L. J. Reinders, H. R. Rubinstein (Weizmann Inst. of Science), and S. Yasaki (European Organization for Nuclear Research) 1982 13 p refs
(PB82-20850; RL-82-017; T-301) Copyright. Avail: NTIS HC A02/MF A01 CSCL 20H

The perturbative and nonperturbative contributions to three-point functions are computed to first order in (alpha sub s). The results are applied to the decay (eta sub c) yields 2 gamma, and large corrections are found compared to the nonrelativistic result. Author (GRA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

No abstracts in this category.

74 OPTICS

Includes light phenomena.

N83-11846# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
APPLICATIONS OF COLORIMETRIC PRINCIPLES AND HUMAN VISUAL MODELS TO MULTISPECTRAL IMAGES [APLICACOES DE PRINCIPIOS COLORIMETRICOS E MODELOS VISUAIS HUMANOS A IMAGENS MULTIESPECTRAIS]
Gilberto Camara Neto Jul. 1982 29 p refs In PORTUGUESE; ENGLISH summary
(INPE-2470-PRE/159) Avail: NTIS HC A03/MF A01

The spectral bands of MSS LANDSAT imageries are presented in false color display in a way which is most adequate for human visual recognition. A convenient colorimetric scale is utilized, suitable for modeling human visual perception; filtering methods are also developed in order to enhance the image, taking into account the properties of the human eye. Author

N83-11847# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTROOPTICAL DEVICES Semiannual Technical Summary, 1 Apr. - 30 Sep. 1981
Charles E. Hurwitz 30 Sep. 1981 51 p refs
(Contract F19628-80-C-0002; AF Proj. 2306; AF Proj. 4600)
(ESD-TR-81-380) Avail: NTIS HC A04/MF A01

Gallium indium arsenide phosphide/indium phosphide lasers with highly uniform and reproducible threshold characteristics were fabricated by careful control of layer thickness and morphology. Reduced threshold current densities of 4 to 5 kA/sq cm - microns were routinely achieved for a wide range of active layer thicknesses. Broad area Be implanted GaInAsP/InP laser diodes were fabricated. The best results were obtained using Be implanted and annealed under conditions which minimize diffusion of the implanted ions. Reduced threshold current densities averaging 6 to 7 kA/sq cm - micron and as low as 4.2 kA/sq cm - micron were measured and are comparable with those of conventional laser structures. Precise control over the thickness and doping of the InP cap layer is required to achieve reproducible results. GaInAsP/InP diode lasers were fabricated with an intracavity electroabsorption modulator. The additional loss produced by operating the modulator near maximum reverse bias increased the laser threshold by a factor of as much as 2.9 relative to the threshold with the modulator open circuited. S.L.

N83-11848# Aerodyne Research, Inc., Billerica, Mass.
OPTICAL ARRAY PROCESSOR Final Report
Jul. 1982 30 p refs
(Contract N00014-82-C-0302)
(AD-A118371; ARI-2622-10) Avail: NTIS HC A03/MF A01 CSCL 20/6

The introduction of noncoherent vector x matrix optical operators has led to the development of an assortment of iterative operations for the rapid performance of such problems as matrix inversion and eigenvector extraction. In this contract Aerodyne Research, Inc. has reexamined all of these concepts and integrated them in a new and surprising way. The new problem solving system is simpler, cheaper, more flexible, and more accurate than its predecessor. Author (GRA)

N83-11849# Clarkson Coll. of Technology, Potsdam, N.Y.
FLUORESCENCE AND LIGHT SCATTERING OF AEROSOL PARTICLES Final Report
Milton Kerker 12 Jul. 1982 5 p
(Grant DRXRO-CB-15703-C)
(AD-A118273; ARO-15703.7-CH) Avail: NTIS HC A02/MF A01 CSCL 20/6

The studies carried out during the period of this grant have responded mainly to the query: how is the raman or fluorescent scattering affected when the active molecules are embedded within dielectric particles or are adsorbed at the outer surface of either dielectric or metallic particles. GRA

N83-11850# Naval Postgraduate School, Monterey, Calif.
SHARP NOSE LENS DESIGN USING REFRACTIVE INDEX GRADIENT
Oded Amichai Jun. 1982 297 p refs
(Contract N00228-81-C-H231; DARPA Order 4035)
(AD-A118246; NPS67-003CR) Avail: NTIS HC A13/MF A01 CSCL 17/5

For infrared sensors located at the nose of a missile or a projectile, an age-old problem occurs. A conflict between optical quality and aerodynamic drag exists. A new approach for solving this problem is being developed using gradient refractive index, GRIN, for lens design. The equations for lens design incorporating GRIN are formulated for the special case of spherically symmetrically GRIN. For infrared sensors located at the nose of a missile or a projectile, an age-old problem occurs. A conflict between optical quality and aerodynamic drag exists. A new approach for solving this problem is being developed using gradient refractive index, GRIN, for lens design. The equations for lens design incorporating GRIN are formulated for the special case of spherically symmetrical GRIN. GRA

N83-11851# Tennessee Univ. Space Inst., Tullahoma.
BRL PARTICLE SIZING INTERFEROMETER
J. W. Farmer Aberdeen Proving Ground, Md. Ballistic Research Lab. Jul. 1982 232 p refs
(Contract DAAD05-79-C-1004)
(AD-A118398; AD-E300071; ARBRL-CR-00485) Avail: NTIS HC A11/MF A01 CSCL 20/6

A particle sizing interferometer designed to measure particle sizes from 0.3 to 500 micrometers has been constructed for the Ballistics Research Laboratory. The device was constructed to measure droplet size distributions produced by high pressure pneumatic nozzles. This report describes the expected operational response of this instrument in high density liquid sprays. Additionally, discussion is provided of theoretical concepts which are

required for data interpretation when the interferometer sample volume depends on droplet sizes. GRA

N83-11852# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.
MATCHED FILTERING WITH ACHROMATIC OPTICAL CORRELATORS
Juris Upatneiks, J. Graeme Duthie, and Paul R. Ashley 23 Feb. 1982 20 p refs
(AD-A118431; AD-E950266; DRSMI/RR-82-5-TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

An achromatic Fourier transform system for use in an optical correlator has been designed and used with incoherent light to obtain autocorrelations of pictures of aerial views of urban areas. The necessary optics included achromatic lenses and some highly achromatic holographic elements in a unique arrangement to produce wavelength independent Fourier transforms.Author (GRA)

N83-11853# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMBINED SPATIAL FILTERING AND BOOLEAN OPERATORS APPLIED TO THE PROCESSING OF REAL IMAGES M.S. Thesis
Blaine E. Feltmate Jun. 1982 346 p refs
(AD-A118076; AFIT/GCS/EE/82J-8) Avail: NTIS HC A15/MF A01 CSCL 20/6

Several new and seemingly successful scene analysis techniques for application to real image processing are presented. These techniques consist of particular combinations of spatial low pass filtering, global thresholding and Boolean operators, specifically the AND, OR and NOT operators. These combinatorial operators, hereafter referred to as the Boolpass operators, perform the task of picture energy/information reduction, while retaining the fundamental picture primitives such as edges which characterize the images. Over 150 figures are included which illustrate the results obtained from application of the Boolpass techniques to eight different natural scenes. These results indicate that the Boolpass operators do display great potential as important components of a larger more comprehensive pattern recognition machine. Such a machine would encompass further processing (for target classification/recognition) of the resulting Boolpass operator information. Author (GRA)

N83-11854# Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
OPTICAL ELECTRONICS AND INFRARED RADIATION Final Report, 10 Feb. 1979 - 9 Feb. 1982
Ali Javan 9 Aug. 1982 16 p refs
(Contract DAAG29-79-C-0028)
(AD-A118319; ARO-16225.3-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

The work has progressed in several fronts. Following extensive previous work at the laboratory, properties of metal-barrier-metal submicron junctions have been explored, with respect to their high-speed responses, frequently mixing characterists, and the physical mechanisms accuring in the junction. The studies are done at cryogenic temperatures and relate to the properties of the mechanically contacted junctions, as well as thin film evaporated junctions. Emphasis is placed on high-speed features originating from rapid variation of the I-V characteristics over narrow ranges of bias voltages, causing sharp enhancements of the junctions IR responses at fixed bias fields. The model employed in the interpretation of the results is based on Fermi-level modulation by the applied high frequency field, determining the high speed current conduction properties of the junctions. Author (GRA)

N83-11855# Utah State Univ., Logan.
SPECTROSCOPIC STUDY OF SMALL ABSORPTIONS IN OPTICAL COATINGS Final Report
Wilford N. Hansen Kirtland AFB, N. Mex. AFWL Jul. 1982 58 p refs
(Contract F29601-79-C-0064; AF Proj. 317J)
(AD-A118314; AFWL-TR-81-139) Avail: NTIS HC A04/MF A01 CSCL 20/6

This report concerns research performed by the Utah University surface physics group for the Air Force Weapons Laboratory (AFWL), Kirtland Air Force Base, New Mexico. It is a supplement to AFWL-TR-79-197. It reports the continued study of thorium fluoride (ThF4) as an optical coating, showing that the moisture found in the ThF4 films probably originated from the preparation itself, and that ThF4 may not degrade by moisture absorption from the atmosphere as rapidly as previously thought. Further advances are reported in the characterization procedures themselves, including computer methods for data handling. New procedures were instituted for determining the optical constants of liquids. To test the procedures, the optical constants of liquid water were determined and compared with values found in literature. The procedures used are reported. A sample of Si3N4 film on germanium was analyzed spectroscopically. The dominant feature was a large infrared band revealing the presence of large amounts of silicon hydride. Finally, new procedures are reported for determining impurity concentrations in optical thin films which takes into account the local electromagnetic field strength seen by an impurity in a known optical material as matrix. Author (GRA)

N83-11856# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
COLOR VISION DEFICIENCIES
D. VanNorren Apr. 1982 50 p refs In DUTCH; ENGLISH summary
(IZF-1982-9; TDCK-76635) Avail: NTIS HC A03/MF A01

Congenital and acquired color vision defects are described in the context of physiological data. Light sources, photometry, color systems and test methods are described. A list of medicines is also presented. The practical social consequences of color vision deficiencies are discussed. Author (ESA)

N83-11857# National Bureau of Standards, Washington, D.C.
CHARACTERIZATION OF A CONCENTRIC CORE FIBER Final Report, 1 Oct. 1980 - 1 Oct. 1981
B. L. Danielson, D. L. Franzen, R. L. Gallawa, E. M. Kim, and M. Young Apr. 1982 29 p refs Sponsored by Army
(PB82-208620; NBSIR-82-1661) Avail: NTIS HC A03/MF A01 CSCL 20F

Optical properties of a concentric-core fiber examined include attenuation, radiation patterns, pulse broadening, index profile, backscatter signatures, and capture fraction. Experimental techniques are described and the significance of the measured parameters is discussed. A.R.H.

N83-11399# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer and Systems Engineering.
OPTICAL INFORMATION PROCESSING
H. Stark *In* AGARD Image Processing Tech. May 1982 11 p refs (For primary document see N83-11390 02-31)
Avail: NTIS HC A11/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-11858 Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
GENERALIZED POISSON BRACKETS FOR DISCRETE AND CONTINUOUS SYSTEMS: APPLICATIONS IN PLASMA PHYSICS
H. Tasso Jun. 1982 19 p refs Presented at Conf. on Dyn. of Fluids and Ionized Gases, Trieste, Italy, 3-5 Jun. 1982
(IPP-6/213) Copyright. Avail: Issuing Activity

Generalized Poisson brackets are discussed without going into the formalism of symplectic forms. It is found that there are rather drastic differences between discrete and continuous systems,

especially with respect to fulfillment of Jacobi identity. Examples are given for the continuous case and the relations of the brackets to Lagrangian derivation, Liouville theorem and Lie groups are explained. Applications, specifically in plasma physics, are mentioned. Author (ESA)

N83-11859# Mission Research Corp., Albuquerque, N. Mex.
KMRAD: A LINEARIZED PARTICLE CODE FOR THE STUDY OF RESISTIVE INSTABILITIES Final Technical Report
T. P. Hughes and B. B. Godfrey May 1982 29 p refs Sponsored by Sandia Labs.
(AD-A117975; AMRC-R-364) Avail: NTIS HC A03/MF A01 CSCL 20/9

A linearized electromagnetic particle simulation code KMRAD has been developed to look at resistive instabilities on electron beams. The code can simulate three-dimensional dynamics, but by use of Fourier transforms in two directions, only one spatial direction needs to be resolved. For cold beam equilibria, KMRAD predicts growth rates which closely agree with those obtained from an exact cold-fluid code. For a Bennett equilibrium, comparisons between KMRAD and available analytic models are presented, and several discrepancies are noted. Author (GRA)

N83-11860# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A VARIATIONAL APPROACH TO THE RAYLEIGH-TAYLOR INSTABILITY OF AN ACCELERATING PLASMA SLAB M.S. Thesis
James D. Targove Dec. 1981 81 p refs
(AD-A118074; AFIT/GEP/PH/81D-11) Avail: NTIS HC A05/MF A01 CSCL 18/3

The growth rate of the hydromagnetic Rayleigh-Taylor instability is approximated here for an accelerating plasma slab. The slab is chosen as a large-radius approximation to an imploding cylindrical foil. A normal mode solution of the MHD equations is assumed, resulting in an integral relation for the instability growth rate. The Rayleigh-Ritz variational method is applied to the relation to estimate the growth rate. A linearly decreasing magnetic field is assumed in the slab perpendicular to the acceleration. A corresponding equilibrium mass density profile is then found. Growth rate estimates are then made for these profiles. Calculations are made for perturbation wavevectors perpendicular to the acceleration and at an angle theta to the magnetic field. The growth rates for theta = 90 degrees compare favorably with LeLevier, et al's results for a continuous density transition (14). Growth rates for theta = 0 degrees are stable for all perturbation wavelengths and magnetic field strengths. This contradicts prior results in both slab and cylindrical geometry and suggests an error in this work. GRA

N83-11861# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ONE DIMENSIONAL ANALYSIS OF INERTIALLY CONFINED PLASMAS M.S. Thesis
David A. DeBruyne Mar. 1982 220 p refs
(AD-A118065; AFIT/GNE/PH/82-5) Avail: NTIS HC A10/MF A01 CSCL 20/9

Energy transfer processes in a thermonuclear plasma including Coulombic phenomena, bremsstrahlung, and Compton scatter are critically reviewed. These processes are incorporated in a three temperature, inertially confined fusion computer simulation which uses a one dimensional, spherical, Lagrangian hydrodynamics scheme. The computer code, still in the validation phase, uses separate subroutines to model hydrodynamics, thermonuclear burn, neutron heating, alpha particle heating, and energy transfer processes in CGS units. GRA

N83-11862# GT-Devices, Alexandria, Va.
PROJECTILE ABLATION AND SURVIVAL IN MASS ACCELERATORS USING HIGH ENERGY DENSITY PLASMAS FOR MASS ACCELERATION Final Report, 22 Jun. 1981 - 21 Jun. 1982
D. A. Tidman and S. A. Goldstein Jun. 1982 48 p
(Contract DAAG29-81-C-0011; DA Proj. 1L1-61102-BH-57)
(AD-A118294; ARO-17917.1-EG-S) Avail: NTIS HC A03/MF A01 CSCL 11/7

Two theoretical methods have been developed for analyzing ablation in MAID projectile accelerators. A one-dimensional model determines the effect of shocks on the ablating layer. It resolves the boundary layer of the plasma-solid interface, and demonstrates shock formation in the plasma. A detailed physics model incorporates detailed chemistry and determines the global average properties of an experimental mass accelerator. Results of experiments are compared with simulations. Excellent agreement is found. Two-dimensional ablation effects are illustrated. Author (GRA)

N83-11863# Department of Energy, Washington, D. C. Office of Technical Information.
ALFVEN WAVE: DOE CRITICAL REVIEW SERIES
A. Hasegawa and C. Uberoi 1982 137 p refs
(DE82-001702; DOE/TIC-11197) Avail: NTIS HC A07/MF A01

The properties of Alfven waves and with their application to fusion are studied. Linear properties in homogeneous and inhomogeneous plasmas are considered. Absorption is treated by means of kinetic theory. Instabilities and nonlinear processes and theory and experiments in plasma heating by Alfen waves are discussed. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N83-11864*# Radio Corp. of America, Somerville, N. J. Solid State Technology Center.
CHARACTERIZATION OF SILICON-GATE CMOS/SOS INTEGRATED CIRCUITS PROCESSED WITH ION IMPLANTATION Final Report, 1 Jul. 1977 - 30 Jun. 1979
D. S. Woo May 1980 29 p
(Contract NAS8-31986)
(NASA-CR-161712; NAS 1.26:161712; PRRL-80-CR-16) Avail: NTIS HC A03/MF A01 CSCL 20K

The double layer metallization technology applied on p type silicon gate CMOS/SOS integrated circuits is described. A smooth metal surface was obtained by using the 2% Si-sputtered Al. More than 10% probe yield was achieved on solar cell controller circuit TCS136 (or MSFC-SC101). Reliability tests were performed on 15 arrays at 150 C. Only three arrays failed during the burn in, and 18 arrays out of 22 functioning arrays maintained the leakage current below 100 milli-A. Analysis indicates that this technology will be a viable process if the metal short circuit problem between the two metals can be reduced. Author

N83-11865# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
LUMINESCENCE AND ELECTRICAL CHARACTERIZATION OF ION IMPLANTED Si:T1 Ph.D. Thesis
Orven F. Swenson Jun. 1982 169 p refs
(AD-A118120; AFIT/DS/PH/82-1) Avail: NTIS HC A08/MF A01 CSCL 20/12

Ion implanted Si:T1 was characterized by luminescence, Hall-effect, Rutherford Backscattering (RBS), and Secondary Ion Mass Spectrometry (SIMS). This is the first reported luminescence study of an implanted dopant in silicon. The same sharp line defects were produced by the T1 heavy ion implants as identified in previous light ion studies. The defects produced by the ion implantation were removed and the T1 activated by a two-step anneal procedure. A high quality annealed implant layer was produced from which the four excited states of the T1 bound exciton no-phonon could be resolved. An unidentified bound exciton peak related to the T1 acceptor was observed for the first time in both ion implanted and bulk grown Si:T1. Temperature dependent Hall-effect measurements were made on the implant layers which indicate that Hall-effect measurements made only at room

temperature are not valid in general for silicon implant layers. The Hall data and luminescence data both indicate that the concentration of activated T1 increases with increasing second anneal temperature. GRA

N83-11866# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN AUTOMATED TEMPERATURE CONTROLLER FOR THE ADVANCED HALL EFFECT EXPERIMENTAL DATA ACQUISITION SYSTEM M.S. Thesis
Daniel John Page Mar. 1982 209 p refs
(AD-A118040; AFIT/GEO/EE/82M-1) Avail: NTIS HC A10/MF A01 CSCL 13/1

The purpose of this study was the development of an automated temperature controller to interface with the automated data acquisition system and the experiment. The temperature controller is designed to control the temperature of the silicon sample to within 0.005 degrees kelvin in the temperature range of 4.2 to 300 degrees Kelvin. The control algorithm measures the thermal impulse response of the system and uses this information to adjust and control the temperature. An MC6809 microprocessor with 10K bytes of EPROM and 640 bytes of RAM is used to implement the controller. The control algorithm and other software was developed to enable the controller to control temperature. A number of problems with the present controller design are identified and recommendations for improvements to the design are made. GRA

N83-11867# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Sciences.
ION-BEAM MILLING OF SILICON CARBIDE EPITAXIAL LAYERS Final Report, 1 Jul. 1981 - 30 Jun. 1982
H. H. Wieder 4 Aug. 1982 17 p refs
(Contract N00014-81-C-0758; NR Proj. 251-052)
(AD-A118010) Avail: NTIS HC A02/MF A01 CSCL 20/12

Ion milling of photolithographically processed silicon carbide heteroepitaxially grown layers on Si is feasible using an aluminum mask which is produced by standard photolithographic procedures and techniques. Author (GRA)

N83-11868# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
MECHANISMS OF RECOVERY IN PLASTIC DEFORMATION AND CREEP Final Report, 1 Mar. 1978 - 31 Aug. 1981
Ali S. Argon 23 Jul. 1982 11 p refs
(Contract DAAG29-78-C-0014)
(AD-A118083; ARO-15112.5-MS; FR-1) Avail: NTIS HC A02/MF A01 CSCL 20/2

Recovery processes in the form of clustering of dislocation configurations in both plastically deforming or creeping copper and nickel single crystals have been investigated by conventional electron microscopy and by high voltage electron microscopy by means of in-situ experiments. The creep response of such alloys and the stages of the recovery processes have also been modeled. Author (GRA)

N83-11869# Engins Matra, Velizy (France).
ASSESSMENT OF CHIP CARRIERS [ENQUETE CHIP CARRIER]
B. LeNormand 28 Dec. 1981 33 p In FRENCH
(REQC-26578) Avail: NTIS HC A03/MF A01

The chip carrier electronics packaging option was assessed. Chip carrier technology was compared with other types (mainly dual inline package) of packaging. Various chip carrier packs which meet SEDEC standards were reviewed. Assembling components in ceramic chip carriers was studied. Availability on the open market was investigated. Even though this pakaging option is at present little used (chip carriers account for only 1% of the market while dual inline packages account for 85%), considerable development is underway. Forecasts for 1985 show chip carriers being used in 20% to 30% of applications compared to 60% for dual inline packages. Author (ESA)

N83-11870# Zentralinstitut fuer Tieftemperaturforschung der Bayerischen Akademie der Wissenschaften, Garching (West Germany).
REGENERATOR FILLED WITH A MATRIX OF POLYCRYSTALLINE IRON WHISKERS Final Report, Jan. 1980
Franz Xaver Eder and Helmut Appel Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 82 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-136; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,50

In thermal regenerators, parameters were optimized: convection coefficient, surface of heat accumulating matrix, matrix density and heat capacity, and frequency of cycle inversions. The variation of heat capacity with working temperature was also computed. Polycrystalline iron whiskers prove a good compromise as matrix for heat regenerators at working temperatures ranging from 300 to 80 K. They were compared with wire mesh screens and microspheres of bronze and stainless steel. For theses structures and materials, thermal conductivity, pressure drop, heat transfer and yield were calculated and related to the experimental values. As transport heat gas, helium, argon, and dry nitrogen were applied at pressures up to 20 bar. Experimental and theoretical studies result in a set of formulas for calculating pressure drop, heat capacity, and heat transfer rate for a given thermal regenerator in function of mass flow. It is proved that a whisker matrix has an efficiency that depends strongly on gas pressure and composition. Iron whiskers make a good matrix with heat capacities of kW/cu cm per K, but their relative high pressure drop may, at low pressures, be a limitation. A regenerator expansion machine is described. Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

No abstracts in this category.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-11871# National Inst. for Aeronautics and Systems Technology, Pretoria (South Africa).
GRAPHICAL STATUS MONITORING SYSTEM FOR PROJECT MANAGERS
M. P. Espenschied Jan. 1981 33 p refs
(CSIR-NIAST-81/7) Avail: NTIS HC A03/MF A01

A graphical project monitoring system is described, using mechanistic and analytical forecasting techniqus to present an overall visual picture (including future trends) of progress to project

managers. The mechanistic technique is used when data over a period of time are reasonably linear; while the analytical technique is required when sharp cost changes are encountered on entering a new project phase. Author

N83-11872# Federal Aviation Administration, Washington, D.C. Office of Aviation Policy and Plans.
ECONOMIC VALUES FOR EVALUATION OF FEDERAL AVIATION ADMINISTRATION INVESTMENT AND REGULATORY PROGRAMS
Ward L. Keech Sep. 1981 80 p refs
(AD-A118255; FAA-APO-81-3) Avail: NTIS HC A05/MF A01 CSCL 05/1

Drawing on economic theory, empirical investigations and data from government, private and academic literature, this report updates economic values commonly used by the Federal Aviation Administration in the evaluation of investment and regulatory programs. These values, commonly referred to as critical values, provide the basis upon which the effectiveness of the aviation system or changes therein may be denominated and assessed in monetary terms. The critical values updated in this report include the value of time of air travelers, the value of a statistical life, unit costs of statistical aviation injuries, unit replacement and restoration costs of damaged aircraft, and aircraft variable operating costs. Author (GRA)

N83-11873# California Univ., Los Angeles. Graduate School of Management.
PROGRAM FOR RESEARCH ON ORGANIZATIONS AND MANAGEMENT: THE UNITED STATES-JAPANESE ELECTRONIC INDUSTRIES STUDY Interim Technical Report
William G. Ouchi, Jay B. Barney, and Dave Ulrich Aug. 1981 35 p refs
(Contract N00014-81-K-0035; NR Proj. 170-920)
(AD-A118106; TR-ONR-5) Avail: NTIS HC A03/MF A01 CSCL 05/3

This paper reviews a long term research project which describes and analyzes the U.S. and Japanese electronics industries. The research is based on an organization theory application of an efficiency model. The project's long range purpose is to describe and understand firm's strategic relations with other firms so that more efficient, equitable, and effective transactions can be determined and implemented. This paper reviews 6 components of this project with preliminary results that indicate structural differences between the U.S. and Japanese electronics industries. Author (GRA)

N83-11874# California Univ., Los Angeles. Graduate School of Management.
PERSPECTIVES IN ORGANIZATION THEORY: RESOURCE DEPENDENCE, EFFICIENCY, AND ECOLOGY Interim Technical Report
Jay B. Barney and Dave Ulrich Jun. 1981 39 p refs
(Contract N00014-81-K-0035; NR Proj. 170-920)
(AD-A118107; TR-ONR-4) Avail: NTIS HC A03/MF A01 CSCL 05/1

Development of alternative models of organizations plays an important role in the development of organization theory. While many views on organizations have received varying degrees of attention, three perspectives have recently been the object of increasing interest, the resource dependence, efficiency, and ecological perspectives. This paper reviews the assumptions, theories and research of each perspective. It then integrates them by showing that a population perspective provides a meta-theoretical framework within which the other perspectives can be interpreted as guidelines. Author (GRA)

N83-11875# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 9: Operations Research.
TWO MANPOWER PLANNING MODELS FOR THE ROYAL NETHERLANDS NAVY. PART 1: GENERAL DESCRIPTION
L. Hoedemaker, G. Konstantis, and D. J. D. Wijnmalen Jan. 1982 79 p refs In DUTCH; ENGLISH summary
(Contract A75/KM/018)
(PhL-1982-04; TDCK-76155) Avail: NTIS HC A05/MF A01

Two models were developed as tools for planning ratings and petty officers of the Royal Netherlands Navy. This planning was carried out over a number of discrete, equidistant time intervals. The models provide information as to strengths, recruitment, promotions, retirement, etc. The first model (LP2) is based on linear programming as a method to optimize an objective function under various restrictions. Four types of optimization were considered: minimization of costs; minimization of the absolute differences between computed and required strengths; and combinations of these two types. The model is designed to be flexible: changes in the Navy manpower structure could be incorporated without difficulty. The matrix-generator may be applied to any manpower structure. The second model, REKMO, is a rather simple model, consuming little computer time. It considers the Navy manpower structure in a more detailed way and over a longer time horizon than LP2. It shows the consequences of input policies rather than calculating an optimal strategy to achieve desired conditions. Calculations are carried out in a straightforward way in accordance with a set of (priority) rules specified by the user. A user manual is also presented. Author (ESA)

N83-11876# Washington Univ., St. Louis, Mo. Center for Development Technology.
EVALUATION OF THE SECOND 5-YEAR OUTLOOK ON SCIENCE AND TECHNOLOGY Final Report
Eugene B. Shultz, Jr. and William P. Darby Apr. 1982 37 p refs
(Grant NSF PRM-81-19828)
(PB82-197252) Avail: NTIS HC A03/MF A01 CSCL 05A

The second Five-Year Outlook on Science and Technology is evaluated. Fifty-one specific issues are raised and discussed. A list of twenty-two topics of major importance is presented for consideration. Policy issues are also discussed. N.W.

N83-11877# Technical Research Centre of Finland, Tampere. Textile Lab.
COMMON CONCEPT OF MANAGING PROCESS AND TECHNIQUES
Ben Malmstroem Jan. 1981 122 p refs
(PB82-204728; TIEDONANTO-20; ISBN-951-38-1129-8;
ISSN-0355-3639) Avail: NTIS HC A06/MF A01 CSCL 05A

The question whether there is to be found a feasible formalization of the managing process, and a common denominator to bring closer together the managing process and common management techniques of applied mathematics. First, some aspects are discussed concerning administrative and organizational theory, as well as the managing process the purpose of which is to master and control the complex interactions of activity programs and time series of them. Second, a number of techniques of applied mathematics are discussed whereby the common ability of producing programs of activities along the time axis is emphasized. Attention is brought to the fact that time series of activities and operations interacting with each other seem to be the common feature and connecting link of the managing process and common techniques. The study forms the background for the development of a deductive conception common for managing process and techniques which is presented in three consecutive publications. Author

N83-11878# Technical Research Centre of Finland, Espoo. Textile Lab.
COMAX HIERACHY PLANNING PROCEDURES
Ben Malmstroem Jun. 1981 51 p refs
(PB82-207242; TIEDONANTO-26; ISBN-951-38-1291-1;
ISSN-0355-3739) Avail: NTIS HC A04/MF A01 CSCL 05A

The comax negotiation or negodet principle was conceptionally developed toward the control of the parallel, sequential and time hierarchy dimensions. The three dimensional hierarchical negodet application enables a systematic simulation of the hierarchical behavior of the real system. The methodology opens the way to develop the inventoriables and noninventoriables comax toward a policy rule and automatic decision level of managerial decisions

refinement as applied to a real system hierarchy. The hierarchical comax control system developed forms a basis for an analogue simulation of a managing process of plan, execute, and review.
GRA

N83-11879# Technical Research Centre of Finland, Espoo. Textile Lab.
THE PROJECTED ACCOUNT CONCEPTION
Ben Malmstroem 28 Oct. 1982 47 p refs
(PB82-204421; TIEDONANTO-21; ISBN-951-38-1130-1; ISSN-0355-3639) Avail: NTIS HC A03/MF A01 CSCL 05A

The managing process to a large extent means master and control of the multitude of programs or time series of activities and their interaction on all hierarchy levels. The time series are planned, reviewed for feasibility, executed, and reviewed for performance continuously in consecutive cycles by the managing process. The development of a basic building block or model unit is considered for the deduction of a conceptual analogue model of the real business system with the purpose to support and formalize the managing process of plan, execute, and review, and with the requirement of being able to adapt common management techniques of applied mathematics. Author

N83-11880# Technical Research Centre of Finland, Espoo. Textile Lab.
ELEMENTARY TRANSFORMATION COMAX PROCEDURES
Ben Malmstroem Jun. 1981 66 p refs
(PB82-207234; TIEDONANTO-25; ISBN-951-38-1289-8; ISSN-0355-3639) Avail: NTIS HC A04/MF A01 CSCL 05A

Elementary transformation comax planning procedures, based on certain comax parameters, which enable a systematic simulation of real business system behavior of elementary transformation processes and their activity time series are developed. The methodology opens the way to develop the transformation comax conception toward a policy rule and automatic decision level of managerial decisions refinement under strict consideration of realism in implementation. The comax control system developed, forms a basis for an analogue simulation of a negotiation and managing process of plan, execute, and review in industrial production processes. GRA

N83-11770# Council for Scientific and Industrial Research, Pretoria (South Africa).
MANAGING AND DOCUMENTING 10-20 MAN YEAR PROJECTS
P. Visser *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 12 p (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-11881*# National Aeronautics and Space Administration, Washington, D. C.
MASTER LIST AND INDEX TO NASA DIRECTIVES
1 Aug. 1982 86 p
(NASA-TM-84871; NHB-1410.4FF; NAS 1.15:84871) Avail: NTIS HC A05/MF A01 CSCL 05B

All NASA management directives in force as of August 1, 1982 are listed by major subject headings showing number, effective data, title, responsible office, and distribution code. Delegations of authority in print by that date are listed numerically as well as by the installation or office to which special authority is assigned. Other consolidated lists show all management handbooks, directives applicable to the Jet Propulsion Laboratory, directions published in the Code of Federal Regulations, complementary manuals, and NASA safety standards. Distribution policies and instructions for ordering directives are included. A.R.H.

N83-11882# Defense Technical Information Center, Alexandria, Va. Committee on Cataloging Rules.
COMPARISON OF DTIC COSATI CATALOGING AND AACR-2 CATALOGING IN THE MARC COMMUNICATIONS FORMAT
Elaine Burress, Sarah Mikel, Bettye Pringle, Asta Kane, Bernice Black, Doris Folen, Bobbie Everidge, and Betty Fox Aug. 1982 40 p
(AD-A118215; RSAG/CRC-82-01) Avail: NTIS HC A03/MF A01 CSCL 05/2

The report compares technical report cataloging records in the MARC format using AACR-2 cataloging rules and in the COSATI format using COSATI rules. Differences in the records discussed include treatment of corporate bodies, report and funding numbers, physical description and differences between monographs and reports. Actual cataloging records in both formats are included. Author (GRA)

N83-11883# Battelle Inst., Frankfurt am Main (West Germany).
REMOTE OFFICE WORK: INFORMATION ENGINEERING FEASIBILITY AND IMPLICATION Final Report, Mar. 1982
Eike Ballerstedt, Michael Dipper, Camilla Krebsbach-Gnath, Renata Mandrella, Hubert Marchand, Wolfgang Heilmann (Integrata GmbH), and Brigitte Kromar (Integrata GmbH) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 368 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-82-002; ISSN-0170-9011) Avail: NTIS HC A16/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 53,50

Feasibility and consequences of remote office work are studied. Remote office work is not practiced in the Federal Republic of Germany; in the US it is being introduced only hesitantly. With certain reservations, telecommuting is technologically feasible, but there are economic and organizational obstacles to its introduction on a large scale. Text processing and programming functions might be performed outside normal offices. Remote office work would have both positive and negative consequences for the telecommuters themselves, for the organizations involved, and for society as a whole. There is no obvious need for public safeguards; an innovative policy is required, however, to overcome technological/organizational problems. Author (ESA)

N83-11884# Office of Management and Budget, Washington, D.C.
FEDERAL INFORMATION COLLECTION: AGENCY ACTIONS ON COMMISSION ON FEDERAL PAPERWORK RECOMMENDATIONS. VOLUME 2: RECOMMENDATIONS TO DEPARTMENTS
Mar. 1982 205 p refs
(PB82-193673) Avail: NTIS HC A01/MF A01 CSCL 05B

The oversight and reporting requirements of the Paperwork Reduction Act and intensified monitoring and evaluation activities are reviewed. Specific actions taken or planned for reach recommendation and projects completion dates for executive branch actions on those recommendations accepted but not yet fully implemented are described. Author (GRA)

N83-11752# Council for Scientific and Industrial Research, Pretoria (South Africa).
THE EFFICIENCY OF SYSTEM DEVELOPMENT AND ITS DETERMINING FACTORS
K. G. vanderPoel *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11753# Council for Scientific and Industrial Research, Pretoria (South Africa).
RESTRUCTURING OF THE CONCEPTUAL SCHEMA TO PRO-

DUCE DBMS SCHEMATA
S. Wulf (Comcon Pty. Ltd., Sandton) *In its* Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 13 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11754# Natal Univ., Pietermaritzburg (South Africa). Dept. of Mathematics.
AN ALTERNATIVE DEVELOPMENT OF THE VIENNA DATA STRUCTURES
N. C. K. Phillips *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 10 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

N83-11769# International Computers Ltd., London (England).
THE CONTENT ADDRESSABLE FILE STORE
V. A. J. Maller *In* CSIR Proc. of the 2nd South African Computer Symp. on Res. in Theory, Software and Hardware 1981 15 p refs (For primary document see N83-11748 02-59)
Avail: NTIS HC A14/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N83-11885# Kommunale Technologie-Beratung Ruhrgebiet G.m.b.H., Oberhausen (West Germany).
DEVELOPMENT OF A CALCULATION MODEL (COMPUTER PROGRAM) FOR COMPARING THE ECONOMICS OF VARIOUS WASTE TREATMENT TECHNOLOGIES Final Report, May 1981
Juergen Stritzke Bonn Bundesministerium fuer Forschung und Technologie Jun. 1982 136 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-090; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 28,50

A computer program was developed which analyzes and compares the economics of planning in terms of investment and operating costs. The program calculates the necessary minimum fees. Different financing models (e.g., conventional financing, financing by funds and so on) are taken into consideration to find an optimum solution. Because of the systematics of given structures of the project and the related costs it is possible to control the procedure during the ordering and building phases for the following purposes: controlling project cost by comparing the nominal to the actual state, and calculating the actual final costs by projecting them on the basis of the escalator clause and by calculating the flow-off of capital. Author (ESA)

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-11886# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MODELING URBAN SPATIAL STRUCTURE FOR DEVELOPING COUNTRIES [MODELAGEM DA ESTRUTURA ESPACIAL URBANA PARA PAISES EM DESENVOLVIMENTO]
Damaceno DalBianco, Odwaldo Bueno Netto, Jr., and Maria Suelena Santiago Barros Apr. 1982 17 p refs In PORTUGUESE; ENGLISH summary
(INPE-2370-PRS/099) Avail: NTIS HC A02/MF A01

A model for planning the spatial structure of urban areas which have the physical, socio-economic, and cultural characteristics of cities in developing countries is presented. Remote sensing data are used to stratify the urban spaces in zones of homogeneous occupation. The first segment of the model addresses the question of locating households under uncertainty, using as decision variables, household income, building standards and urbanization level of the neighborhood. The second segment addresses the question of locating services and commercial activities, considering their accessibility by the resident population. Industries are located exogenously under urban use regulations. The model was applied to Sao Jose dos Campos. M.G.

N83-11887# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Flugverkehrswissenschaft.
THE MODAL SPLIT IN THE JAPANESE PASSENGER TRANSPORTATION SYSTEM
Dieter Eberlein Jan. 1982 52 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-82-09) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16,70

The modal split in the Japanese long-distance passenger transportation system as well as its reasons and impacts are examined. Competition between automobile and train, and between train and airplane, are analyzed. Results show that the competition in Japan is completely different from that in other industrialized countries by reason of the high performance railway network. The secondary impacts are explained with respect to energy consumption and traffic accidents. Transportation demand development in comparison with Germany is described. Author (ESA)

N83-11888# Environmental Protection Agency, Research Triangle Park, N.C. Meteorology and Assessment Div.
WAKE OF A BLOCK VEHICLE IN A SHEAR-FREE BOUNDARY FLOW: AN EXPERIMENTAL AND THEORETICAL STUDY In-House Report, 1 Jan. 1979 - 1 Oct. 1981
Robert E. Eskridge (NOAA) and Roger S. Thompson Mar. 1982 116 p
(PB82-196528; EPA-600-3-82-007; FMR-13) Avail: NTIS HC A06/MF A01 CSCL 13F

The wake of a moving vehicle was simulated using a specially constructed wind tunnel with a moving floor. A block shaped model vehicle was fixed in position over the test section floor while the floor moved at the freestream air speed to produce a uniform, shear free, approach flow. This simulates an automobile traveling along a straight highway under calm atmospheric conditions. Vertical and lateral profiles of mean and fluctuating velocities and Reynolds stresses in the wake of the vehicle were obtained using a hot film anemometer with an X probe. Profiles were taken at distances of 10 to 80 model heights downwind. A momentum type wake was observed behind the block shaped vehicle. The wake does not have a simple self preserving form. However, it is

possible to collapse the velocity deficit with one length and one velocity scale. A theory which considered a height dependent eddy viscosity was found to fit the data best. Length and velocity scales were found for the longitudinal variation of the turbulent kinetic energy. The lateral variation is described by a two dimensional numerical fit of the crosswind variation of the data. GRA

88 SPACE SCIENCES (GENERAL)

N83-11889# European Space Agency, Paris (France).
THIRD EUROPEAN IUE CONFERENCE
E. Rolfe, comp., A. Heck, comp., and B. Battrick, comp. Jun. 1982 634 p refs Conf. held at Madrid, 10-13 May 1982; sponsored in cooperation with Consejo Superior de Investigaciones Cientificas
(ESA-SP-176; ISSN-0379-6566) Avail: NTIS HC A99/MF A01
The IUE investigations of cool stars cataclysmic variables, X-ray sources, hot stars, binaries, and extragalactic objects were discussed. Future UV experiments with the Magellan satellite are outlined. For individual titles, see N83-11890 through N83-12000.

N83-11890*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
THE STRUCTURE, ENERGY BALANCE, AND WINDS OF COOL STARS **c89**
Jeffrey L. Linsky *In* ESA 3rd European IUE Conf. Jun. 1982 p 3-14 refs (For primary document see N83-11889 02-88)
(Grants NAG5-82; NGL-06-003-057; NAG5-199)
Avail: NTIS HC A99/MF A01 CSCL 03A
Solar magnetic field phenomena which occur in cool stars are summarized. Factors which can produce magnetic fields in stars are listed. Information on cool star atmospheres, provided by high dispersion spectra, is discussed. These spectra show that in Beta Dra (G2 Ib) the transition lines are red shifted (an antiwind), perhaps indicating downflows in closed magnetic flux tubes, as seen in the solar flux tubes above sunspots. The G and K giants and supergiants are classed as active, quiet, or hybrid, depending on whether their atmospheres are dominated by closed magnetic flux tubes, open field geometries, or a predominantly open geometry with a few closed flux tubes embedded. Author (ESA)

N83-11891# Vrije Universiteit, Brussels (Belgium). Inst. of Astrophysics.
STELLAR EVOLUTION AFTER IUE. PART 1: MASSIVE STARS DURING CORE HYDROGEN BURNING AND MASSIVE CLOSE BINARIES **c90**
C. deLoore and A. Maeder (Geneva Observatory) *In* ESA 3rd European IUE Conf. Jun. 1982 p 15-20 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
The effect of mass loss rates on stellar evolution is discussed. Position of mass outflow tracks, overluminosity, and the formation of Wolf-Rayet stars are considered. Computations which take the effects of stellar wind, mass transfer and mass loss during Roche lobe overflow, and accretion into account are described. Computation and IUE studies of stellar chemical composition generally agree, except for WC stars where N lines are found in spite of theoretical expectations that during helium burning all nitrogen is depleted. Accretion computations for massive close binaries show that the chemical profile of the accreting component has the same behavior as that of a normal main sequence star of the same mass, in the stellar interior. In the outer layers the hydrogen content is smaller. The observed overluminosity of the optical companions of X-ray binaries can be explained by stellar wind mass losses. Author (ESA)

N83-11892# Geneva Observatory (Switzerland).
STELLAR EVOLUTION AFTER IUE. PART 2: A RENEWAL FOR MASSIVE STARS AND WOLF-RAYET (WR) STARS **c90**
Andre Maeder (Vrije Univ., Brussels) and Camille deLoore *In* ESA 3rd European IUE Conf. Jun. 1982 p 21-29 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
The consequences for the evolution of massive stars of mass loss in the main sequence phase, and especially the helium burning phase, are examined. Abundances determined from IUE observations are compared with the theoretically expected values. The importance of nitrogen (and neon) abundance determinations in WC stars is emphasized in relation with the possibilities of mixing in massive stars and the variety of the possible scenarios for forming WR stars. Problems concerning the abundances of CNO elements in planetary nebulae are mentioned. It is argued that different evolutionary sequences can lead from OB stars to supernova explosions, depending on initial mass and mass loss rates. Author (ESA)

N83-11893# Consiglio Nazionale delle Ricerche, Bologna (Italy). Inst. di Radioastronomia.
ULTRAVIOLET PROPERTIES OF SUPERNOVAE **c90**
N. Panagia *In* ESA 3rd European IUE Conf. Jun. 1982 p 31-36 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
The results of IUE observation of three Type I and two Type II supernovae are discussed. Type I supernovae are all found to display a very similar spectrum. It is structured in broad bands and declines steeply with decreasing wavelength so that only a minor fraction of their luminosity falls in the UV. Type II supernovae have a considerable continuous UV emission and display strong emission lines of highly ionized species. Spectral properties at radio, X-ray, and near IR wavelengths are also mentioned.
Author (ESA)

N83-11894# Royal Greenwich Observatory, Herstmonceux (England).
INTERSTELLAR GAS STUDIES WITH IUE **c89**
Max Pettini *In* ESA 3rd European IUE Conf. Jun. 1982 p 37-42 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
The IUE studies of abundance, energetic events in the interstellar medium, highly ionized gas in the galactic disk, and the galactic halo are described. Abundance studies suggest that the degree of depletion of refractory elements is well correlated with the average line of sight density of the gas. Zinc could be used as a tracer of the metallicity of the gas. The role played by supernovae explosions and mass loss winds from early stars in regulating the energy balance and motions of the interstellar medium was studied by observing the shocked gas from these events. Surveys of CIV and SIV absorption lines in early stars support the hypothesis that these species were formed primarily by photoionization in circumstellar matter. The influence of tidal interaction between the Milky way and its companions in the Magellanic Clouds was studied. Author (ESA)

N83-11895# Astronomical Inst., Utrecht (Netherlands). Space Research Lab.
REVIEW OF GALACTIC ULTRAVIOLET ASTRONOMY **c89**
Cornelis deJager *In* ESA 3rd European IUE Conf. Jun. 1982 p 43-46 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
Results of IUE investigations of: chromospheres, coronas and winds of cool stars; hot stars and supernovae; binaries and novae; mass loss and the late evolution of single massive stars, are summarized. Stars in the pre-main sequence phase; interstellar matter; and the galactic halo, were also studied. Author (ESA)

N83-11896# Observatoire de Meudon (France).
IUE OBSERVATIONS OF GIANT PLANETS, SATELLITES AND ASTEROIDS **c89**
Therese Encrenaz *In* ESA 3rd European IUE Conf. Jun. 1982 p 47-57 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01
The UV observations of the giant planets, their satellites, and asteroids, performed before IUE, by IUE, and by the Voyager 1 and 2 UV spectrometers are compared. The improved spectral

resolution of IUE, relative to previous UV observations, made possible the observation of NH3 on Jupiter and C2H2 on Jupiter and Saturn. Due to both its spatial and spectral resolutions, IUE provided a valuable contribution to the Voyager UV results especially in the Ly alpha emission and for the study of Io and Europa. The IUE provided the first detailed UV data on asteroids.
Author (ESA)

N83-11897# Padua Univ. (Italy). Asiago Astrophysical Observatory.
STELLAR POPULATIONS IN NORMAL GALAXIES c90
Massimo Capaccioli *In* ESA 3rd European IUE Conf. Jun. 1982 p 59-68 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The impact of UV observations of normal galaxies on understanding of stellar populations is reviewed. The UV data show that ellipticals (E) possess a population of hot stars. The nature of this component (old versus young stars) is discussed on the basis of current models and recent findings on globular clusters. It is argued that factors such as age stratification, metallicity mixtures and recurring bursts of star formation are plausible explanations of the UV morphology of E galaxies. The heterogeneous UV phenomenology of spirals is also considered, emphasizing the problem of galactic reddening. The changing properties of spectra of galaxies along the Hubble sequence are discussed, focusing on the consequences for stellar evolution and cosmology.
Author (ESA)

N83-11898# Royal Greenwich Observatory, Herstmonceux (England).
ACTIVE GALAXIES OBSERVED BY IUE c89
M. V. Penston *In* ESA 3rd European IUE Conf. Jun. 1982 p 69-74 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE contribution to the study of active galaxies and quasars fainter than the 16th magnitude is summarized. The IUE provides a diagnostic for the source of ionization in active galaxies and casts light on the excitation mechanism of the Fe II lines. It shows that the broad hydrogen lines in Seyferts and quasars are not in their recombination ratios and demonstrates the absence of gas in BL Lacertae objects. The IUE data support the gravitational lense explanation of the double quasar and demonstrate the presence of a hot (30,000 K) black body in active nuclei. The IUE discovered stratification of the ionization conditions in the broad line regions of active nuclei.
Author (ESA)

N83-11899# Royal Observatory, Edinburgh (Scotland).
EXTRAGALACTIC ULTRAVIOLET ASTRONOMY AND COSMOLOGY c89
M. S. Longair *In* ESA 3rd European IUE Conf. Jun. 1982 p 75-79 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

It is shown how ultraviolet astronomy has the capability of addressing many fundamental questions in extragalactic astronomy and cosmology. The importance of discoveries relating to GNC 4151 is stressed. Space telescope uses are considered and the contribution of IUE is discussed. The need for systematic observations of normal galaxies is emphasized.
Author (ESA)

N83-11900# Oxford Univ. (England). Dept. of Theoretical Physics.
AN ANALYSIS OF THE ULTRAVIOLET SPECTRUM OF T TAURI c89
C. Jordan, M. C. deM. Ferraz, and A. Brown (Queen Mary Coll., London) *In* ESA 3rd European IUE Conf. Jun. 1982 p 83-88 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE T Tauri data are considered. Significant changes are seen in the Mg II line profiles at different epochs. An emission measure distribution is derived and chromospheric models are computed. There is evidence from lower temperature lines of two different density components in the chromosphere. A two-component model is deduced, involving a low density region with Ne = 1 billion per cu cm, possibly associated with the observed stellar wind, and a high density region with Ne = 100 billion per cu cm. The high density region is the source of the high temperature emission, such as C IV, N V and the X-rays. The chromospheric radiation losses are a significant fraction of the stellar luminosity.
Author (ESA)

N83-11901# Landessternwarte auf dem Koenigstuhl, Heidelberg (West Germany).
T TAURI STARS: NOT ONE BUT TWO TRANSITION REGIONS c90
Claude Bertout *In* ESA 3rd European IUE Conf. Jun. 1982 p 89-94 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

It is shown that IUE and X-ray observations of T Tauri stars can be explained by a model which takes the cooling and condensing of a moderately dense corona into account. This model includes two transition regions between coronal gas and cool gas: the usual zone between chromosphere and corona, and the region between corona and cool circumstellar gas. The variations with temperature of the transition region emission measures, as deduced from IUE observations of a few T Tauri stars, are compared to those of the computed models. Agreement is found for mass loss rates much lower than usually assumed for T Tauri stars.
Author (ESA)

N83-11902# Royal Greenwich Observatory, Herstmonceux (England).
FAR UV LINE WIDTHS IN RU LUPI c89
M. V. Penston and M. T. V. T. Lago (Grupo de Matematica Aplicada) *In* ESA 3rd European IUE Conf. Jun. 1982 p 95-98 refs Sponsored by Fundacao Gulbenkian (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Two high dispersion spectra from the IUE LWR instrument, and one from the SWP instrument, were analyzed. The Mg II line widths are very similar to the Ca II and Balmer lines (approximately 250 and 240 km/sec.) The UV higher excitation lines, C IV, Si IV, Si III and C III show widths very similar to those of the optical He lines, and are narrower than the strong Mg II, Ca II and Balmer lines. This is consistent with a model wind driven by Alfven waves in which, after a maximum near 250 km/sec, the wind velocity decreases away from the star while the gas temperature rises.
Author (ESA)

N83-11903# Observatoire de Meudon (France).
ON THE Mg 2 AND Fe 2 RESONANCE LINES IN HERBIG Ae STARS: PRELIMINARY RESULTS c89
A. Talavera, C. Catala, L. Crivellari, J. Czarny, P. Felenbok, and F. Praderie *In* ESA 3rd European IUE Conf. Jun. 1982 p 99-105 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE observed AB Aur, HD250550, and BD + 46 deg 3471 at high resolution in the range 2000 to 32000 A. The MgII resonance line profiles all show a P Cygni structure, with an intense emission, and a shortward wing velocity in the absorption component of 300 to 600 km/sec. In HD 250550, the Fe II line spectrum exhibits a shell phenomenon: all lines are blue displaced by -290 km/sec; other lines of singly ionized species show the same effect. The mass loss rate in AB Aur estimated from an analysis of both MgII resonance lines and unsaturated Fe II multiplet 1 lines is smaller than previously reported.
Author (ESA)

N83-11904# Observatoire de Meudon (France).
CONTRIBUTION TO THE STUDY OF THE DUST ENVELOPE OF AB AURIAGE c90
C. Catala *In* ESA 3rd European IUE Conf. Jun. 1982 p 107-111 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The properties of the grains in the CS envelope of AB Aur were investigated, using UV extinction and IR excess data. The UV extinction spectrum was compared with Mie theory predictions for spherical grains of different compositions and sizes. Silicate

grains are shown to be capable of producing the anomalous extinction curve. A model of IR emission by a spherical cloud of silicate grains shows that these grains cannot be responsible for the IR excess in the 2 to 6 microns range. This excess could be due to grains other than silicates, e.g., iron, or to free-free emission from a hot plasma. Author (ESA)

N83-11905# Amsterdam Univ. (Netherlands). Inst. of Astronomy.

THE VARIABLE SHELL STAR HR 5999. PART 7: THE EXTENDED ATMOSPHERE OF A HERBIG Ae STAR: CHROMOSPHERIC FEATURES **c90**

H. R. E. TjinADjie and P. S. The *In* ESA 3rd European IUE Conf. Jun. 1982 p 113-116 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

The IUE and ground-based spectroscopic observations of the nebular variable HR 5999 are discussed. Results show strong chromospheric emission lines in the spectra of this star. The emission measures of the high temperature lines suggest a low temperature gradient and large radiation losses for the transition region. The large energy loss points to the presence of convective motions in the surface layers of the star, which are probably a remnant of earlier phases in the evolution of the star. A correlation of emission line fluxes with rotation velocity indicates that dynamo magnetic fields play a major role in the transfer of energy from the convective region to the chromospheric and transition region of a star. Author (ESA)

N83-11906# Catania Astrophysical Observatory (Italy).

ULTRAVIOLET RESONANCE LINE EMISSIONS OBSERVED WITH IUE **c89**

C. Blanco, L. Bruca, S. Catalano, and E. Marilli *In* ESA 3rd European IUE Conf. Jun. 1982 p 117-121 refs Prepared in cooperation with Catania Univ., Italy (For primary document see N83-11889 02-88)

(Contract CNR-N.81.00932.02)

Avail: NTIS HC A99/MF A01

Observations of ultraviolet emission line spectra obtained with the IUE in the region 1200 to 2000 A are reported. Low resolution spectra for a representative sample of main sequence stars in the spectral range A5 to K5 and the supergiant alpha Agr are considered. High excitation temperature lines are detected in stars later than A7 and absolute fluxes are determined. The detection of stellar chromospheres and transition region features in stars earlier than FO is discussed. The C IV emission flux decreases with the effective temperature of main sequence; low emission quiet stars are distinguished. Other transition region emission lines show comparable fluxes to the C IV with no particular trend against the formation temperature. Flux ratios to the quiet Sun in all F stars show an increasing trend with the excitation temperature and show a minimum near the C IV line formation temperature, as the active Sun to quiet ratio does. Author (ESA)

N83-11907# Armagh Observatory (Northern Ireland).

ROTATIONAL MODULATION OF CHROMOSPHERIC FEATURES IN LATE-TYPE STARS **c90**

P. B. Byrne, C. J. Butler, A. D. Andrews, J. L. Linsky (Colorado Univ., Boulder), T. Simon (Colorada Univ., Boulder), N. Marstad (Colorado Univ., Boulder), M. Rodono (Catania Astrofisico Observatorio, Italy), C. Blanco (Catania Astrofisico Observatorio, Italy), S. Catalano (Catania Astrofisico Observatorio, Italy), and E. Marilli (Catania Astrofisico Observatorio, Italy) *In* ESA 3rd European IUE Conf. Jun. 1982 p 125-127 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Three RS CVn-type binaries (HR 1099, II Peg, and AR Lac) and the prototype BY Dra binary system were observed by IUE at regular intervals throughout their 2.0 to 6.7 day periods. Ground based photometry and radio observations were also made. Flux variations of emission lines formed in the chromospheres and transition regions of two of these stars are discussed. The phase relationship between the photometric observations and the line variations and their relevance to the location of dark star spots are considered. The evidence suggests that in the spotted variables the fluxes of the chromospheric and transition region lines vary in a manner such that maximum line flux corresponds to optical minimum or maximum spot visibility. This is consistent with a model of a solar-like dark spot distribution on the surface of these stars. Author (ESA)

N83-11908# European Southern Observatory, Munich (West Germany).

IUE OBSERVATIONS OF CLASSICAL CEPHEIDS **c89**

W. Eichendorf, B. Reipurth (Copenhagen Univ.), B. Caccin (Naples Univ.), G. Russo (Osservatorio Astronomico di Capodimonte, Naples), and C. Sollazzo *In* ESA 3rd European IUE Conf. Jun. 1982 p 129-133 refs Sponsored by Danish Space Board and CNR (For primary document see N83-11889 02-88)

(Grant DFG-Ei-164/1)

Avail: NTIS HC A99/MF A01

The impact of IUE low and high dispersion UV spectroscopy on studies of Cepheid chromospheres, blue companions of Cepheids, and on mass determinations for Cepheids is discussed. Results for R Mus, V 810 Cen, and S Mus are presented. While the single star R Mus offers the possibility to study the Cepheid low resolution UV spectrum from 1200 to 3200 A, both V 810 Cen and S Mus have hot blue companions. Star S Mus is proposed as a candidate for a direct mass determination, using IUE high dispersion short wavelength spectra. Author (ESA)

N83-11909# Osservatorio Astronomico, Trieste (Italy).

SEARCH FOR TI 2 5-MULTIPLET EMISSIONS IN SELECTED DELTA SCUTI VARIABLES **c89**

F. Castelli, M. Fracassini (Osservatorio Astronomico, Brea, Milan), and L. E. Pasinetti (Osservatorio Astronomico, Brea, Milan) *In* ESA 3rd European IUE Conf. Jun. 1982 p 135-138 refs Sponsored by CNR Prepared in cooperation with Milan Univ. (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Simultaneous emissions in the Ti II 5 multiplet and Mg II h and k doublet, found in late type stars by Gurzadyan, were sought in Delta Scuti variables Rho Pup, Beta Cas, and Tau Cyg. The comparison of the computed spectra and the observed ones, in the range 3062 to 3094 A shows simultaneous emissions which increase progressively. The simultaneity of these emissions confirms the results found by Gurzadyan. Author (ESA)

N83-11910# Kapteyn Astronomical Lab., Groningen (Netherlands).

Fe 2 ABSORPTION LINES IN THE IUE HIGH RESOLUTION SPECTRA OF F SUPERGIANTS AND SHELL STARS **c89**

D. P. Gilra *In* ESA 3rd European IUE Conf. Jun. 1982 p 139-141 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

The IUE UV spectrum of F supergiant alpha Car was used to study the spectra of Be and shell stars, enigmatic binary epsilon Aur, intersystem FeII lines, and instrumental effects. The UV spectra of alpha Car show very strong absorptions due to FeII lines from the ground state and low lying metastable levels. Comparison with the spectrum of epsilon Aur shows that epsilon Aur B is similar in spectral type and luminosity to epsilon Aur A (FO Ia). The spectra of B and A shell stars show striking resemblance to that of alpha Car. Several intersystem lines of FeII are also identified in the spectrum of alpha Car. Author (ESA)

N83-11911# Queen Mary Coll., London (England). Dept. of Physics.

OUTER ATMOSPHERIC PROPERTIES OF BETA DRACONIS (G2 Ib-2) **c90**

A. Brown, C. Jordan (Oxford Univ.), T. R. Ayres (Lab. for Atmospheric and Space Science, Boulder, Colo.), J. L. Linsky (Joint Inst. for Lab. Astrophysics), and R. E. Stencel (Joint Inst. for Lab. Astrophysics) *In* ESA 3rd European IUE Conf. Jun. 1982 p 142-148 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Observations of the supergiant Beta Draconis made by IUE

are discussed. Electron pressure is comparable with that found in the quiet solar atmosphere. The X-ray fluxes from previous observations suggest T = 10 to 20 million k, when combined with the analysis of the IUE spectra; this would be greater than the proton escape velocity. The radiation losses between 10, 000 and 100,000 K exceed those from the Sun by an order of magnitude, but in the absence of a stellar wind the energy losses from the corona would be lower than in the Sun. The line profile widths indicate substantial (M=2) nonthermal broadening. If interpreted as energy associated with a wave flux, they would imply more coronal energy than required by radiation and conduction losses, suggesting an energetic mass loss. However, line asymmetries can also be interpreted as motions within the atmosphere. Author (ESA)

N83-11912# Queen Mary Coll., London (England). Dept. of Physics.

A SEARCH FOR Mg 2 h AND k EMISSION CORE VARIABILITY IN SIX MAIN SEQUENCE STARS **c89**

J. E. Beckman, M. L. Franco (Osservatorio Astron., Trieste, Italy), P. Molaro (Scuola Internatl. Super. di Studi Avanzati, Miramare, Italy), G. Vladilo (Osservatorio Astron., Trieste), and L. Crivellari (Obs. de Meudon, France) *In* ESA 3rd European IUE Conf. Jun. 1982 p 149-155 refs Sponsored by SRC and CNR (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Spectra of six main sequence stars with spectral types from F0 to G8 were obtained with the IUE long wavelength spectrograph at high resolution. Four or more spectra of each object were taken over a period of 3.5 years, supplemented by archive spectra from IUE of the same type. Quantitative analysis of the Mg II h and k emission cores from these spectra was performed to search for sporadic or periodic variability. No variations > the + or - 10% level set by the statistical fluctuations within each set of spectra occur for any object. Even the limited photometric accuracy claimed here is not guaranteed among spectra which vary in exposure time by more than 15%. This situation for all IUE LWR spectra can be improved only by solving the problem of background subtraction. Author (ESA)

N83-11913# Universidad Complutense, Madrid (Spain). Dept. of Astrophysics.

THE TRANSITION REGION STRUCTURE OF SOLAR-LIKE STARS **c90**

M. J. Fernandez-Figueròa, E. deCastro, and M. Rego *In* ESA 3rd European IUE Conf. Jun. 1982 p 157-159 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Far UV emission lines of three late type stars, two dwarfs, and one subgiant were analyzed to determine the structure of their outer atmospheres. Emission line fluxes were used to find the emission measure distributions. A sample of transition region models was derived, using three boundary values of the electron pressure. The temperature gradients reach a maximum value at a temperature which depends only on the emission measure. The steep temperature gradient models give an impossible negative energy input at temperatures around 100,000 K. However, the radiation losses exceed the net conductive fluxes at low Te.

Author (ESA)

N83-11914*# Oxford Univ. (England). Dept. of Theoretical Physics.

HIGH RESOLUTION EUV SPECTROSCOPY OF 56 PEGASI (KO 2p + wd) **c89**

C. Jordan, A. Brown (Queen Mary Coll.), T. R. Ayres (Lab. for Atmospheric and Space Physics, Boulder, Colo.), J. L. Linsky (Joint Inst. for Lab. Astrophysics), and R. E. Stencel (Joint Inst. for Lab. Astrophysics) *In* ESA 3rd European IUE Conf. Jun. 1982 p 161-164 refs Sponsored by SRC (For primary document see N83-11889 02-88)

(Grants NAG5-82; NGL-006-003-057; NAG5-199)

Avail: NTIS HC A99/MF A01 CSCL 03A

The hypothesis that X-ray and UV emission by 56 Pegasi (K0II p + wd) originates in a conventional chromosphere, transition region and corona, as opposed to Schindler's hypothesis of accretion of the cool stellar wind onto the white dwarf companion, is discussed. Analysis of IUE data indicates that within the uncertainties associated with determining the stellar radius and abundances, the chromosphere, transition region, and corona of 56 Peg are similar to that of Beta Draconis both in structure and energy balance. The accretion hypothesis is not a unique explanation of the observed spectral properties and the white dwarf companion may not play a direct role. Furthermore, 56 Peg, according to current values of V-R and luminosity class, is on the nonsolar side of the Linsky-Haisch dividing line whereas Beta Draconis is on the solar side. Author (ESA)

N83-11915# Joint Inst. for Lab. Astrophysics, Boulder, Colo.

VARIABILITY OF COOL STARS AT OPTICAL AND ULTRAVIOLET WAVELENGTHS **c90**

J. L. Linski, P. L. Bornmann, M. Rodono (Catania Univ., Italy), V. Pazzani (Catania Univ., Italy), A. D. Andrews (Armagh Observatory, Northern Ireland), C. J. Butler (Armagh Observatory, Northern Ireland), and P. B. Byrne *In* ESA 3rd European IUE Conf. Jun. 1982 p 165-167 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Ground based optical, and IUE observations of AU Mic are described. One definite flaring event, remarkable changes of the BY Dra-type optical light curve and evidence of slow variability in the chromospheric and transition region line fluxes (probably due to the rotational modulation of photospheric starspots and plages, respectively), was found. The fractional surface area covered by active regions (filling factor) shows a definite variability with the temperature of line formation, i.e., with atmospheric height. This suggests significant surface and vertical structuring of active regions in the outer atmosphere of AU Mic. Author (ESA)

N83-11916# Manchester Univ. (England). Dept. of Astronomy.

STELLAR ACTIVITY IN THE SHORT PERIOD SUBGROUP OF THE RS CVn SYSTEMS **c90**

E. Budding and A. Gimenez (Univ. Complutense) *In* ESA 3rd European IUE Conf. Jun. 1982 p 169-173 refs (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

The MgII 2800 A feature was studied in several spectrograms, obtained with IUE, for selected binaries among the RS CVn systems. The surface flux in emission was used as a measure of activity and its relevance is shown for the short period subgroup of the RS CVn like stars. Although the sample size is low, indications of correlation between such activity and rotational velocity as well as the scale of irregular photmetric distortions are presented. All the systems show filling of the MgII feature between 2770 and 2818A with respect to the Sun. Results indicate activity at least 10 times that of the Sun. This is attributed to rotationally induced enhancement of emission. Author (ESA)

N83-11917# University Coll., London (England). Dept. of Physics and Astronomy.

ULTRAVIOLET OBSERVATIONS OF NOVA ACQUILA, 1982 **c89**

M. A. J. Snijders and J. C. Blades *In* ESA 3rd European IUE Conf. Jun. 1982 p 177-178 ref (For primary document see N83-11889 02-88)

Avail: NTIS HC A99/MF A01

Observations by IUE of the nova Aquila, announced on 27.85 Jan. 1982 UT, with visual magnitude of 6 to 7 are described. Observations made during 24 Feb. and 2 Mar. show that the nova has a heavily reddened spectrum, E(B-V) = 0.55 + or - 0.15, and a complex short wavelength spectrum with both narrow emission features and broad absorption troughs, indicating terminal velocities as high as 10,000 km/sec. Both the continuum flux and the absorption line profiles show complex changes between 24 Feb. and 2 Mar. On 24 Feb. short period variations were also present. Complementary optical, infrared and ultraviolet observations were obtained on 9 April. Author (ESA)

N83-11918# Cambridge Univ. (England). Inst. of Astronomy.
SIMULTANEOUS UV AND OPTICAL OBSERVATIONS OF DWARF NOVAE THROUGH OUTBURST **c89**
B. J. M. Hassall, J. E. Pringle, R. A. Wade, and J. A. J. Whelan *In* ESA 3rd European IUE Conf. Jun. 1982 p 179-186 refs Sponsored by SRC (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ground based optical, and IUE UV simultaneous spectrophotometry in the range 1200 to 7000 A of three dwarf novae (VW Hydri, WX Hydri and EK TrA) at quiescence and maximum is discussed. With one exception, the spectra are poorly fitted by the standard model disk spectrum, so the validity of the assumptions that the disk is both steady state and emitting as black bodies at a range of temperatures was reassessed. The rise spectrum of VW Hydri shows that the UV outburst lags at least one day behind the optical. The flux must first increase in the cooler, outer parts of the disk and only later in the inner disk, thus ruling out the mininova model of dwarf nova outbursts. The P Cygni features are seen in two objects in superoutburst. Mass loss rate from the system is small (< 1%) compared with the mass transfer rate from the secondary star. Author (ESA)

N83-11919# Osservatorio Astrofisico, Asiago (Italy).
THE PECULIAR ENERGY DISTRIBUTION OF THE OLD NOVA GK PER (1901) **c89**
A. Bianchini and F. Sabbadin *In* ESA 3rd European IUE Conf. Jun. 1982 p 187-189 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

It is demonstrated that the UV to visual flux distribution of the old nova GK Per can be interpreted as the emerging spectrum from a standard accretion disk, having inner radius R = 13 million cm, and M = 1 X 10 to the 18th power g/sec. The magnetic field (B) at the surface of the white dwarf is 200 million G. Disk models which take into account the effects of the magnetic field on the radial structure of the disk would indicate much lower values of R, specific mass M and B, but fail to account for the observed flux distribution below 1600 A. Author (ESA)

N83-11920# Institut d'Astrophysique, Paris (France).
THE ORBITAL VARIATIONS OF THE UV SPECTRUM OF THE OLD NOVA HR DEL **c89**
Y. Andrillat (Haute Provence Observatory, France), M. Friedjung, and P. Puget *In* ESA 3rd European IUE Conf. Jun. 1982 p 191-192 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The form of the UV continuum of HR Del is discussed. The IUE spectra indicate the presence of a power law continuum, close to the classical accretion disk law of Lynden-Bell. A very high accretion rate of 0.00001 N/yr is found for the disk. Orbital variations of the continuum and emission line fluxes during a shift in 1980, can be interpreted as due to occultation of central regions of the disk by material associated with the outer edge of the disk. Author (ESA)

N83-11921# Osservatorio Astronomico, Trieste (Italy).
THE SPECTRUM OF THE SYMBIOTIC STAR CH CYG IN DECEMBER 1981 **c89**
M. Hack, M. Persic, and P. L. Selvelli *In* ESA 3rd European IUE Conf. Jun. 1982 p 193-195 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE observations of CH Cyg are discussed. The continuum energy distribution fits very well that of a late A supergiant. It is not clear whether this kind of continuum can be produced in a pseudo-photosphere formed in the chromospheric transition region of the M6 giant during the activity phases, or, (if CH Cyg is a semidetached binary system), in the accretion disk around the compact component. The presence of inverse P Cyg profiles in the Fe II lines can be interpreted in terms of infalling material, after an outburst associated with mass ejection. The presence of two shortward displaced absorption peaks of circumstellar origin in the Mg II emissions, at the same time with the Fe II inverse P Cyg profiles, indicates a complex dynamic structure around the star. Author (ESA)

N83-11922# Osservatorio Astronomico, Trieste (Italy).
SHORT-TIME SPECTRAL VARIATIONS OF THE OLD NOVA RR PIC **c90**
P. C. Selvelli *In* ESA 3rd European IUE Conf. Jun. 1982 p 197-199 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV spectrum of RR Pic was continuously monitored for 6 hours by IUE. The line spectrum is characterized by strong transitions of high ionization species. The intersystem lines are weak or absent. No P Cyg profiles are present. There is marginal evidence for the presence of coronal lines. After correction for reddening, the continuum can be represented by a standard disk power law. There are variations in the lines (factor of 5) and in the continua (factor of 1.5). The observed variations disagree with the behavior in the visible region. Probably these variations are not intrinsically phase related, but might be ascribed to transient phenomena or activity phases. Author (ESA)

N83-11923# Osservatorio Astronomico, Trieste (Italy).
THE SPECTRUM OF THE OLD NOVA V 603 AQL BETWEEN 2000 AND 3200 A **c89**
P. L. Selvelli and A. Cassatella (ESA, Madrid) *In* ESA 3rd European IUE Conf. Jun. 1982 p 201-202 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

One high resolution spectrum and five low resolution ones of nova Aql, taken by IUE, are discussed. All the emission lines, being so wide and shallow that they cannot be detected in the high resolution spectrum, are very probably formed in the accretion disk. There is no contribution from the chromospheric transition region of the red companion, nor is there any trace of any nebular contribution from the envelope ejected at the time of the outburst. Coronal lines might be present. There are variations in the lines (by a factor of 2) and in the continuum (by a factor of 1.3) among spectra taken in close sequence. It is questionable, however, whether these variations are intrinsically phase related. The observed maximum of the Mg II emission and of the continuum around phase = 0 might be attributed to a transient phenomenon. This might explain the disagreement with the visible data and the previous far UV observations. Author (ESA)

N83-11924# Institut d'Astrophysique, Paris (France).
A REVIEW OF THE ULTRAVIOLET RESULTS ABOUT SYMBIOTIC STARS **c89**
M. Friedjung and R. Viotti (CNR, Frascati, Italy) *In* ESA 3rd European IUE Conf. Jun. 1982 p 203-208 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ultraviolet properties of the symbiotic stars, and results on AG Dra and other objects, are discussed. Different single and binary model are examined: hot star surrounded by a cool envelope; cool star with a hot envelope; and binary systems. Accretion disks seem to play a role in some cases. Stellar winds from both components, but especially from the cool one, must be taken into account. There is evidence of excess heating of the outer layers of the cool component. Author (ESA)

N83-11925# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Astronomy.
LINE SHAPES FROM THE SYMBIOTIC STAR V 1016 CYG **c89**
H. Nussbaumer *In* ESA 3rd European IUE Conf. Jun. 1982 p 209-212 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

High resolution IUE observations of the line shapes emitted by V 1016 Cyg are discussed. Half widths of these lines at half maximum, expressed in terms of velocity, vary between 10 km/sec for the lowly ionized atoms, and 40 to 50 km/sec for the most highly ionized ions. Feeble wide wings, corresponding to v < 600 km/sec are seen on some of the lines. The hypothesis that

V 1016 is a very young planetary nebula is advanced.
Author (ESA)

N83-11926# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
STRONG UV EXCESS RADIATION IN CATACLYSMIC VARIABLES **c90**
W. Wargau, H. Drechsel, and J. Rahe *In* ESA 3rd European IUE Conf. Jun. 1982 p 215-218 refs (For primary document see N83-11889 02-88)
(Grant DFG-RA-136/10-1)
Avail: NTIS HC A99/MF A01

The absolute UV continuum flux distribution (IUE SWP, and LWR spectra) of nine cataclysmic variables is compared with several steady state optically thick accretion disk models. For most of the systems, the flux distribution is not well explained by these approaches. The shapes of the UV continua can alternatively be interpreted as superposition of two black body sources: a hot component originating from the boundary layer, and a cooler component which is radiated by the accretion disk and/or the bright spot. Author (ESA)

N83-11927# Milan Univ. (Italy). Ist. di Fisica.
FAR UV OBSERVATIONS OF MV LYRAE IN TWO DIFFERENT STATES **c89**
L. Chiapetti, L. Maraschi, E. G. Tanzi (CNR, Milan), and A. Treves *In* ESA 3rd European IUE Conf. Jun. 1982 p 221-223 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Observations of MV Lyrae in states characterized by the presence of emission lines, and by a continuum with absorption features not always visible are discussed. The ultraviolet continuum at minimum is compared with archival observations, taken when the source was in a brighter state. A model of the activity of the star is proposed. At minimum, mass transfer is absent. In the intermediate state, with moderate mass transfer, the system behaves similarly to SS Cyg at minimum. In the high state, the transition from a line emitting phase to a continuum with absorptions should be due to the inner edge of the disk extending down to the white dwarf surface. If this general picture is correct, the X-rays should soften considerably in the high state. Independently of the model, the X-ray and UV observations indicate that the bulk of the luminosity is emitted shortward of the IUE range in the EUV region. Author (ESA)

N83-11928# European Space Agency, Madrid (Spain). IUE Observatory.
UV OBSERVATIONS OF V348 SGR **c89**
A. Heck, L. Houziaux (Liege Univ.), A. Cassatella, D. diSeregoAlighieri (ESTEC, Noordwidjk, Netherlands), and F. Macchetto (ESTEC, Noordwidjk, Netherlands) *In its* 3rd European IUE Conf. Jun. 1982 p 225-228 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE UV observations of V348 Sgr are reported together with contemporaneous ground based spectroscopic and photometric observations. The data favor a model that includes a B0-B1 central star with high C, He, N, O abundance in the normal stage at maximum light. The possibility of V348 Sgr belonging to the evolutionary sequence of R CrB stars is also considered. Absolute visual magnitude and temperature estimates support this hypothesis. Author (ESA)

N83-11929# European Space Agency, Madrid (Spain). Villafranca Satellite Tracking Station.
THE UV VARIABILITY OF T Cr B **c89**
A. Cassatella, P. Patriarchi, P. L. Selvelli (Osservatorio Astronomico, Trieste, Italy), L. Bianchi, C. Cacciari, A. Heck, M. Perryman (ESTEC, Noordwidjk, Netherlands), and W. Wamsteker *In its* 3rd European IUE Conf. Jun. 1982 p 229-231 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The continuum and rich emission line spectrum during the activity phase of T Cr B are discussed. Features of the UV continuum include a flat spectrum in Mar 1979, regular increase of the integrated luminosity and UV excess from Mar 1979 to Feb 1981, and decay of the integrated flux from Feb to Dec 1981. The overall appearance of the emission line spectrum indicates the presence of a high temperature plasma in which most of the lines (except He II) are collisionally excited. The lines are generally stronger when the continuum is stronger. Author (ESA)

N83-11930# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
ULTRAVIOLET, OPTICAL, AND INFRARED OBSERVATIONS OF HDE 245770/A 0535+26 **c89**
F. Giovannelli, C. Deloore (Vrije Univ., Brussels), C. Bartolini (Bologna Univ.), M. Burger (Vrije Univ., Brussels), M. FerrariToniolo, A. Giangrande, A. Guarnieri (Bologna Univ.), P. Persi, A. Piccioni (Bologna Univ.), and E. L. vanDessel (Royal Belgium Observatory, Brussels) *In* ESA 3rd European IUE Conf. Jun. 1982 p 233-239 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Observations of the Be X-ray source A 0535 + 26 are described. The features of the source changed notably between Feb. and Oct. 1981: the magnitude of the optical companion decreased by 0.2 M in less than one year, in passbands U, B. and V. The infrared magnitude decreased by 0.6 M in the K band and the ultraviolet flux is nearly invariable. The variations in different wavelength regions are probably due to changes in the circumstellar envelope. November 1981 high resolution IUE spectra clearly show C IV and Si IV lines with P Cygni profiles. February and October 1980 profiles did not show this characteristic (due to intrinsic variability of the source and/or a consequence of the smaller S/N ratio of the spectra). From the Si IV and C IV P Cygni profiles, a mass loss rate of 6 X 10 to the minus 9th to 10 to the minus 8th power M/yr is estimated. From the infrared excess, a mass loss rate of 6 x 10 to the minus 6th power M/yr is obtained. Radio observations at 18 cm give an upper limit of 36 mJy from A 0535+26. Author (ESA)

N83-11931# Commissariat a l'Energie Atomique, Saclay (France). Section d'Astrophysique.
THE ULTRAVIOLET SPECTRA OF NEWLY DISCOVERED HARD X-RAY CATACLYSMIC VARIABLES **c89**
J. M. Bonnet-Bidaud, M. Mouchet (Observatoire de Meudon, France), and C. Motch (ESO, Munich) *In* ESA 3rd European IUE Conf. Jun. 1982 p 241-244 refs Sponsored by ESO (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The hard X-ray sources 1E0643-1648 and 4U1849-31 were observed with IUE at low spectral resolution. The two sources show an UV spectrum typical of cataclysmic variables, in particular their line spectrum is characterized by strong resonance lines in emission. The UV continuum is compared with the predicted energy distribution from black body, power law and accretion disk models. Comparison of 2A0526-328 and H2252-035 indicates that the flux distribution from UV to optical can be described by standard steady state accretion disk emission with self consistent parameters. However, optical and ultraviolet data suggest that these sources could be intermediate between polar and nonmagnetic systems.
Author (ESA)

N83-11932# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
ULTRAVIOLET OBSERVATIONS OF X-RAY BURSTERS **c89**
G. Hammerschlag-Hensberge, J. A. vanParadijs, and J. E. McClintock (MIT, Cambridge.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 247-248 refs Sponsored by Netherlands Organization for the Advancement of Pure Research (ZWO) (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV energy distribution of the X-ray burst source MXB 1735-44 is discussed. The ratio of X-ray to bolometric flux was used to estimate the thickness of the accretion disk which links the neutron to the low mass star in the MXB system. Optical and

UV emission of MXB was assumed to be due to reprocessing of X-rays in the disk. It is suggested that a highly ionized disk corona shields the disk by scattering up to half of the X-ray flux away from the disk, allowing a relatively small disk to shield the optical companion. Author (ESA)

N83-11933# European Space Agency, Paris (France). Astronomy Div.

IUE HIGH RESOLUTION OBSERVATIONS OF HOT STARS EMITTING CORONAL X-RAYS **c89**

Luciana Bianchi *In its* 3rd European IUE Conf. Jun. 1982 p 251-257 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Far UV resonance lines of 21 early stars, which were observed in the soft X-ray band with the Einstein satellite, were examined using IUE high resolution spectra to search for correlation between the X-ray coronal emission and far UV spectral properties. Quantities that give information on the structure of the outer envelope (e.g., wind terminal velocities, emission-absorption ratios) were measured and compared with the observed X-ray flux. A correlation, albeit with a very large scatter, of terminal velocity and bolometric luminosity appears. For NV and C IV resonance lines, equivalent width of the absorption components increases with effective temperature until an upper limit is reached.
Author (ESA)

N83-11934# Amsterdam Univ. (Netherlands). Inst. of Astronomy.

UV PHOTOMETRIC AND LINE-WIDTH VARIABILITY OF LMC-4 **c89**

M. vanderKlis, G. Hammerschlag-Hensberge, J. M. Bonnet-Bidaud (CEA, Saclay, France), S. A. Ilovaisky (Observatoire de Meudon, France), M. Mouchet (University Coll., London), W. M. Glencross (University Coll., London), A. J. Willis (University Coll., London), J. A. vanParadijs, E. J. Zuiderwijk (ESO, Munich), and C. Chevalier (Observatoire de Meudon, France) *In* ESA 3rd European IUE Conf. Jun. 1982 p 259-260 refs Sponsored by Netherlands Organization for the Advancement of Pure Research (ZWO) (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Low resolution IUE spectra of the massive X-ray binary LMC X-4 were obtained between 1200 and 3200 A. Comparison of these observations with theoretical light curves for an X-ray heated tidally distorted star indicate the existence of a disk around the compact star. The resonance doublets of N V, C IV, and Si IV show marked changes with orbital phase, being particularly weak when the X-ray source is in front of the primary. These changes can be understood in terms of an anisotropic ionization structure in the expanding atmosphere of the primary caused by the presence of the X-ray source. Author (ESA)

N83-11935# Observatoire de Paris (France).

THE INTERACTING BINARY KX AND **c90**

F. Paterson-Beeckmans, A. M. Hubert-Delplace, H. Hubert, and D. Ballereau *In* ESA 3rd European IUE Conf. Jun. 1982 p 261-265 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

A high resolution far UV spectrum of the interacting binary KX And (HD 218393) was obtained near the minimum radial velocity of the visual shell lines. It shows strong emission lines (P Cygni profiles) originating in an extended atmosphere and strong, relatively narrow, absorption lines possibly originating in a cold shell rotating around the primary B2III-IV star. Binary KX And was compared with interacting binary HD 41335 (B2V) and with Rho Per (BIV). The effects of the hot secondary are obvious in Rho Per, while in HD 41335, a system probably more similar to KX And, the interaction with a companion (counter stream or density increase) is manifested during a very short time interval (one day). Author (ESA)

N83-11936*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE WC6 STAR HD76536 COMPANION **c90**

G. E. Bromage (SRC, Chilton, England), W. M. Burton (Astronomical Inst., Utrecht, Netherlands), K. A. vanderHucht (ESTEC, Noordwidjk, Netherlands), F. Macchetto, and C. C. Wu *In* ESA 3rd European IUE Conf. Jun. 1982 p 269-271 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01 CSCL 03B

The variability of HD76536 was observed by IUE. Photometric variability is confirmed by measurements with the IUE fine error sensor. Profile changes in the ultraviolet emission lines and stellar wind absorptions were studied. Data favor a binary model with a low luminosity (perhaps compact) secondary. Author (ESA)

N83-11937# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.

MASS LOSS FROM EXTREME HELIUM STARS **c90**

U. Heber, W.-R. Hamann, and D. Schoenberner *In* ESA 3rd European IUE Conf. Jun. 1982 p 273-276 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Indications of mass loss were found in the UV spectra of stars HD 160641, BD-9 4395 and BD+10 2179, obtained with IUE in high resolution. The observed ionization fractions were compared with warm, cool and corona models. Mass loss rates for the three stars were derived and compared with theoretical predictions as well as with empirical correlations established for early stars of normal composition. Mass loss rates for the helium stars have an order of magnitude similar to that of massive stars of similar luminosity. However, the mass loss must depend on a second parameter, radius or effective temperature, i.e., cooler stars have smaller mass loss. Because the extreme helium stars probably develop towards the left in the HR diagram, results imply that they also increase their mass loss with time. Author (ESA)

N83-11938# Landessternwarte auf dem Koenigstuhl, Heidelberg (West Germany).

SK-67/111 AND R 50, TWO MAGELLANIC CLOUD EMISSION LINE STARS **c89**

F. J. Zickgraf, B. Wolf, R. Viotti (CNR, Frascati, Italy), O. Stahl, O. Ricchiardi (CNR, Frascati, Italy), G. Muratorio (Observatoire de Marseille), M. Friedjung (Inst. d'Astrophysique), and A. Cassatella (ESA, Madrid) *In* ESA 3rd European IUE Conf. Jun. 1982 p 277-279 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The SK-67/111 (05f) of the large Magellanic Cloud (LMC) and the peculiar emission line star R 50 of the small cloud were observed by IUE and by telescope. From the Si IV resonance doublet a mass loss rate of 0.000005 M/yr was obtained for SK-67/111, in agreement with calculations based on the H alpha emission intensity. No significant difference is found for this LMC star with the mass loss rate of corresponding galactic stars. Observations of R 50 show that it is a late B type star surrounded by a cool dense envelope. Its mass loss rate is on the order of 0.00005 M/yr. Author (ESA)

N83-11939# Royal Observatory, Edinburgh (Scotland).

H-R DIAGRAM FOR EARLY TYPE MAGELLANIC CLOUD MEMBERS **c90**

K. Nandy, D. H. Morgan, G. I. Thompson, A. Willis (University Coll., London), R. Wilson (University Coll., London), and L. Houziaux (Liege Univ.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 281-282 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Low resolution UV spectra of a sample of Large Magellanic Cloud (LMC) early type members were obtained with the IUE. The sample includes 25 supergiants and 4 giants. Complementary visible data were obtained. The effective temperatures and bolometric magnitudes of these objects were determined by comparison with models. Results indicate that there is no significant difference between LMC and galactic stars. Author (ESA)

N83-11940# Universidad Nacional Autonoma de Mexico, Mexico City.

A STUDY OF LINE PROFILE VARIABILITY IN O STARS **c89**

R. G. Costero, M. L. Franco (Osservatorio Astronomia, Trieste, Italy), E. Kontizas (National Observatory, Athens), M. Kontizas (Athens Univ.), and R. Stalio (Osservatorio Astronomia, Trieste, Italy) *In* ESA 3rd European IUE Conf. Jun. 1982 p 283-285 refs Sponsored by CNR (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Five 0 type stars were monitored with the IUE high resolution instrument in order to detect profile variability of a selected sample of lines which are sensitive indicators of outer atmospheric structures. Results confirm variability in UV profiles. Star Lambda Ori A has a high velocity secondary absorption component of the profiles which changes in strength, but not in velocity. The interpretation of this component and of the associated variability suggests the presence of a postcoronal, spherically symmetric, constant velocity, shell-like zone with a mean relative ionic column density related linearly to the absorption equivalent widths. Variations in columnar densities are seen as changes in the equivalent width of displaced absorption. Radial thickness of the shell can be estimated from its distance from the photosphere and from the ionization equilibria of the measured atomic species. Author (ESA)

N83-11941# Observatoire de Paris (France).
EMPIRICAL ATMOSPHERIC VELOCITY PATTERNS FROM COMBINED IUE AND VISUAL OBSERVATIONS: THE Be STARS **c89**
V. Doazan and R. N. Thomas (Inst. d'Astrophysique) *In* ESA 3rd European IUE Conf. Jun. 1982 p 287-290 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Observations of 59 Cyg show the strongest displacements of the far UV superionized lines at epochs of minimum H alpha emission. Phases of strongest mass flux, measured in the chromospheric coronal regions, do not coincide with phases of largest mass content in the overlying cool H alpha envelope. Velocities in the chromosphere-corona range up to 1500 km/sec; those in the H alpha and Fe II emission envelope, and absorption shell, do not exceed 1 to 200 km/sec. The density in the postcoronal regions is not fixed by a monotonically-outward accelerated flow; strong deceleration and cooling of the mass-flow within a few radii are required. The Be stars have the same atmospheric pattern as planetary nebulae but the decelerated cool regions occur within a few radii as contrasted to the 1 million or more radii for normal planetary nebulae. Author (ESA)

N83-11942# Institut d'Astrophysique, Paris (France).
BEHAVIOR OF THE ENERGY DISTRIBUTION OF 59 CYG IN THE FAR ULTRAVIOLET AND IN THE VISIBLE **c90**
L. Divan and J. Zorec *In* ESA 3rd European IUE Conf. Jun. 1982 p 291-293 refs Prepared in cooperation with Coll. de France (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Interstellar reddening of 59 Cyg, its luminosity, and the appearance and disappearance of the circumstellar spectrum in Be stars are discussed. An interstellar reddening value E(B-V) = 0.067, smaller than the older determinations, is reported. The interstellar 2200 A feature is not contaminated by the circumstellar spectrum. The total luminosity of 59 Cyg was determined at two different phases, with emission and nearly without emission. No difference between the two luminosities was detected and they are equal to the luminosity of a normal B star having the same lambda sub 1 D parameters as 59 Cyg. It is suggested that Be/Shell star envelopes are more or less permanent and that the appearance and disappearance of the circumstellar spectrum is due to small perturbations. Author (ESA)

N83-11943# Kiel Univ. (West Germany).
NON-LTE ANALYSIS OF THE SDO STAR FEIGE 110 **c89**
U. Jeber, W.-R. Hamann, K. Hunger, R. P. Kudritzki, K. P. Simon, and R. H. Mendez (Inst. de Astronomia y Fisica del Espacio, Buenos Aires) *In* ESA 3rd European IUE Conf. Jun. 1982 p 297-300 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Effective temperature, gravity, and helium abundance of Feige 110 were determined by a NLTE model analysis of high resolution IUE and visual spectra. Effective temperature = 40.000 (+5000, -2500) K and log g = 5.0 (+0.5, -0.3) [Cgs]. Feige 110 is helium deficient (n(Ne)/n(H) = 0.03 + or - 0.01) and thus belongs to the group of sbOB-stars. The abundances of carbon and nitrogen were obtained from the analysis of ultraviolet resonance lines (C IV and N V). Nitrogen is approximately solar, whereas carbon is extremely deficient with respect to the Sun (by a factor of roughly 300,000). The Si IV resonance lines are not present in the ultraviolet spectrum. Author (ESA)

N83-11944# University Coll., London (England). Dept. of Physics and Astronony.
ULTRAVIOLET SPECTROSCOPY AND EFFECTIVE TEMPERATURE VARIATIONS IN THE EXTREME HELIUM STAR BD + 13 DEG 3224 **c89**
A. E. Lynas-Gray, P. W. Hill (Univ. Observatory, St. Andrews, Scotland), and D. Schoenberner (Kiel Univ., West Germany) *In* ESA 3rd European IUE Conf. Jun. 1982 p 301-307 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE observations of BD + 13 deg 3224 are discussed. Luminosity varies by 33% of the maximum on a 0.1 day period. Plane-paralled LTE atmospheres in hydrostatic equilibrium indicate a mean effective temperature of 26.200 + or - 1000 K, log g = 4.0 + or - 0.2 and a hydrogen abundance of n(H)/n(He) = 0.01 (by number). Effective temperature and angular radius variations were obtained by interpolation between two LTE models. Coupling these results with ground-based radial velocity observations gives a stellar radius of 1.42 + or - 14R. The observed range in effective temperature is 4200 K, the observed radius variation being 0.167R. Temperature and pressure changes in the envelope suggest ionization to be important in the pulsation. Author (ESA)

N83-11945# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
ANALYSIS OF FIEGE 66, ANOTHER EXTREMELY SILICON-DEFICIENT OB SUBDWARF **c90**
B. Baschek, P. Hoeflich, and M. Scholz *In* ESA 3rd European IUE Conf. Jun. 1982 p 309-311 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

A high resolution IUE spectrum from 1160 to 3230 A of Feige 66 was analyzed by model atmosphere techniques differentially to OB subdwarf HD 149382. The stars have similar effective temperatures and surface gravities, and exhibit remarkably similar abundance patterns. Author (ESA)

N83-11946# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
THE METALLICITY OF THE EXTREME HELIUM STAR BD + 10 DEG 2179 **c90**
U. Heber *In* ESA 3rd European IUE Conf. Jun. 1982 p 313-316 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ultraviolet and visual spectra of BD + 10 deg 2179 were analyzed, using line blanketed LTE model atmospheres. The atmosphere consists mainly of helium (98.9% by number) with a small admixture of carbon (1%). Hydrogen is reduced to 0.1% by number. The metal abundances are considerably different from those of the Sun (when normalized with respect to total mass). The abundance pattern for elements heavier than magnesium is very similar to that of the high velocity giant alpha Boo, i.e., the iron group is underabundant by roughly 1.0 dex., while Al-S are approximately solar. Analysis of other helium stars shows that these stars do not form a homogeneous group with respect to their surface composition. Their masses range from 0.6 to 1.0 M. Author (ESA)

N83-11947# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysique.
RADIATIVE TRANSFER CALCULATIONS FOR THE C 4 LAMBDA 155 mm RESONANCE LINES IN PLANETARY NEBULAE **c90**
J. Koeppen and R. Wehrse *In* ESA 3rd European IUE Conf. Jun. 1982 p 317-321 refs Sponsored by Deutsche Forschungsmeinschaft (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ionization models for NGC 6210, 7009, 3242 and II 2003 were constructed from optical and IUE spectral data. The predicted CIV 155 nm resonance line is about 10 times stronger than observed. Radiative transfer calculations of the CIV lines in a spherical nebula, assuming partial frequency redistribution, were made to investigate the effects of dust absorption and an additional depopulation of the upper level. Neither effect explains the CIV discrepancy. Factors affecting the ionization balance (atomic parameter, ionizing radiation field) seem more promising. Author (ESA)

N83-11948# Tufts Univ., Boston, Mass. Astronomisches Inst.
THE PLANETARY NEBULA NGC 6572 **c89**
M. Grewing, G. Kraemer, P. Dietz, and P. R. Preussner *In* ESA 3rd European IUE Conf. Jun. 1982 p 323-325 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE satellite observed the UV spectrum of the medium excitation planetary nebula NGC 6572 in low and high resolution. The overall UV continuum energy distribution (extinction corrected) can be fitted by a black body with T = 44,000 K. From the P-Cygni profiles seen in the C IV 1550 A, N V 1240 A, and in the O V 1371 A lines, wind velocities = 1860 km/sec, 2240 km/sec, and 1420 km/sec, respectively. Absolute fluxes are given for a number of emission line features. Those arising from C, N, and O are discussed and abundances relative to H II are determined for these elements. A ratio n (C) / n (O) = 1.2, which differs significantly from the solar value, is found. Author (ESA)

N83-11949*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE UV STELLAR CLASSIFICATION PROGRAM **c90**
A. Heck, P. BenVenuti, L. Bianchi, J. Blades, C. Cacciari, A. Cassatella, A. Cucchiaro, D. Egret, C. Jaschek, M. Jaschek et al *In* ESA 3rd European IUE Conf. Jun. 1982 p 327-330 refs Prepared in cooperation with ESTEC, Madrid; Science Research Council, Chilton, England; Liege Univ., Belgium; Strasbourg Univ., France; and Royal Observatory, Edinburgh (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01 CSCL 03B

The UV stellar classification program based on IUE data, its rationale, and its status, are described. The program provides sequences of calibrated spectra covering all spectral types. Author (ESA)

N83-11950# University Coll., London (England). Dept. of Physics and Astronomy.
CV SERPENTIS: STILL ECLIPSING **c89**
Ian D. Howarth, Allan J. Willis, and Dave Stickland (Royal Greenwich Observatory, Hertsmonceaux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 331-334 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Three IUE SWP instrument spectra, which show that CV Ser continues to eclipse in IV, were obtained. Data (interpreted as eclipses of the O star by the Wolf-Rayet (WR) wind) do not explain the Hjellming-Hiltner eclipse at which 80% of the WR wind was removed. Dramatic changes in size of the components are unlikely, since the out of eclipse magnitude of the system is constant. Mass loss or mass transfer explanations are suggested. A mass loss rate of 0.000072 M/yr, variable by a factor of 2 on a time scale of a year was calculated. The atmospheric eclipse model for the observed spectral variations is consistent with published results for theta Mus if the system is triple, with an unseen secondary in close orbit with the WR component. Optical radial velocities support this picture. Author (ESA)

N83-11951# Royal Greenwich Observatory, Herstmonceux (England).
A STUDY OF CQ CEPHEI: FAR UV TO INFRARED **c89**
D. Stickland, W. M. Burton (SRC, Chilton, England), G. E. Bromage (SRC, Chilton, England), A. J. Willis (University College, England), I. D. Howarth (Manchester Univ., England), E. Budding (Leicester Univ., England), and R. F. Jameson *In* ESA 3rd European IUE Conf. Jun. 1982 p 335-338 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Reappraisal of old optical spectrograms and photometry of the close binary Wolf-Rayet (WR) star, CQ Cephei, was combined with optical and infrared photometry and high and low resolution data from IUE. Data suggest that the companion to the WN7 star is at least partially immersed in the WR wind. However, the nature of the companion is not positively established. Author (ESA)

N83-11952# Hamburg Univ. (West Germany). Hamburger Sternwarte.
UV RESONANCE LINE FORMATION IN ZETA AUR/VV CEP SYSTEMS **c90**
K. Hempe and D. Reimers *In* ESA 3rd European IUE Conf. Jun. 1982 p 339-341 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Phase dependent observations of CS lines in Zeta Aur/VV Cep systems were compared with detailed line profile calculations in the escape probability approximation. The scattering lines were treated in terms of the Sobolev method. For the line source function the escape probability method was used in a two level approximation. The emergent flux is calculated by formal integration of the radiative transfer equation in the observer's frame. Remarkable agreement between theoretical and observed profiles, confirming the reliability of analysis based on the line transfer scheme, is found. Author (ESA)

N83-11953# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
EVOLUTION OF THE SUBDWARF O ECLIPSING BINARY LB 3459 **c90**
R. P. Kudritzki, K. P. Simon, A. E. Lynas-Gray (University Coll., London), D. Kilkenny (South African Astronomical Observatory, Cape Town), and P. W. Hill (St. Andrews Univ., Scotland) *In* ESA 3rd European IUE Conf. Jun. 1982 p 343-348 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ground based and IUE spectra were used in an NLTE analysis of the LB 3459 primary. Effective temperature = 40,000 K (+3000, -2000), log g = 5.3 + or - 0.2, with helium abundance = 0.3% (+0.2, -0.1) by number. The binary seems to be the result of mass exchange during the first giant phase. The primary is thought to have a mass of 0.3M and consists of a hydrogen shell and degenerate helium core. Diffusion is suggested as the cause of helium depletion in the photosphere. From light curve synthesis, a secondary effective temperature of 8500 + or 2000 K is suggested. The secondary mass is 0.04M and the radius is 0.09R. This is close to a degenerate configuration of solar composition. Author (ESA)

N83-11954# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
NEW OBSERVATIONS OF THE INTERACTING BINARY SV CEN **c89**
H. Drechsel, W. Wargau, and J. Rahe *In* ESA 3rd European IUE Conf. Jun. 1982 p 349-350 refs (For primary document see N83-11889 02-88)
(Grants DFG-Dr-131/2-1; DFG-Ra-136/3z; DFG-Ra-136/10-1)
Avail: NTIS HC A99/MF A01

Previous optical (photoelectric and spectroscopic) and IUE observations of the early type contact binary SV Cen were

supplemented by UV measurements. Optical photometric data suggest variations of the mass loss rate on a time scale of a few years, while the analysis of UV resonance line profiles shows short-term stellar wind fluctuations. The UV continuum is dominated by a hot (100,000 K) radiation source. The release of rotational energy of asynchronously rotating stars can account for the observed UV excess. Author (ESA)

N83-11955# Max-Planck-Institut fuer Astrophysik, Munich (West Germany).
THE IUE SURVEY OF W UMa TYPE BINARIES c89
S. M. Rucinski and O. Vilhu (Helsinki Univ.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 351-354 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Homogeneous reductions of IUE low resolution observations of the brighter W UMa contact binaries were analyzed in terms of the transition region line fluxes. The fluxes, together with X-ray data, were used to study emission strength dependence on the temperature of the emitting plasma and on the period of stellar rotation. The contact binaries are found to have similar transition region line fluxes irrespective of the period. However, the fluxes are much below values expected from a direct extrapolation of the data for the detached binaries of longer periods. Author (ESA)

N83-11956# Hamburg Univ. (West Germany). Hamburger Sternwarte.
MASS LOSS RATE FROM IUE OBSERVATIONS OF ZETA AUR SYSTEMS c90
A. Che, K. Hempe, and D. Reimers *In* ESA 3rd European IUE Conf. Jun. 1982 p 355-357 refs (For primary document see N83-11889 02-88)
(Grants DFG-Re-353/7-1; DFG-Re-353/6-3; DFG-Re-353/6-4; DFG-Re-353/6-5)
Avail: NTIS HC A99/MF A01

A method which determines the mass loss rate of the red supergiant in Zeta Aur systems, using resonance lines, is presented. The method exploits a three dimensional nonspherical line transfer code. The wind is assumed to be expanding spherically. The line source function is treated by Sobolev approximation. The Fe II UV mult. 9 photon lines are used. Due to the unfavorable branching ratio these are emitted as mult. 191 lines. Observed equivalent widths of the absorption lines are matched with theoretical line strengths parametrized by mass loss rate and stellar wind velocity. For 32 Cyg, mass loss rate = 0.000000018 M/yr, wind velocity = 40 km/sec, microturbulence velocity = 25 km/sec. For Zeta Aur, the values are 0.00000004 M/yr, 35 km/sec, and 30 km/sec for 31 Cyg, 0.000000017 M/yr, 40 km/sec, and 25 km/sec.
Author (ESA)

N83-11957# Hamburg Univ. (West Germany). Hamburger Sternwarte.
SYSTEM APPARATUS AND MASS LOSS OF DELTA SGE c90
D. Reimers and K. P. Schroeder *In* ESA 3rd European IUE Conf. Jun. 1982 p 359-362 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Improved orbital elements of the Delta Sge system were determined, using radial velocity measurements. Combined with phase dependent speckle interferometric measurements of the angular separation of the components and with a distance of 100 pc, a mass ratio of 3.5 is obtained. The distance was determined under the assumption that the companion is a main sequence star with effective temperature = 10,500 K (B9) as found from IUE fluxes. A mass loss rate of 0.00000002 M/yr is found for the M2 II primary, using circumstellar FeII absorption lines in the UV spectrum of the B star companion. Author (ESA)

N83-11958# Warsaw Univ. Observatory (Poland).
ANALYSIS OF UV SPECTRA OF BETA LYRAE c89
Henryk Cugier *In* ESA 3rd European IUE Conf. Jun. 1982 p 363-367 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Line profiles that are produced in a spherically symmetrical expanding envelope were calculated. The model assumes that the envelope surrounds a stationary core that emits continuum radiation. Mass ejection rate is constant, with density variation determined by the equation of continuity and a velocity law. Statistical equilibrium in atomic level populations, governed by radiative and thermal collisional processes, is also assumed. Comparison of model results with IUE spectra of Beta Lyrae indicates that the mass loss rate = 0.000003 M/yr. Author (ESA)

N83-11959# Florence Univ. (Italy). Ist. di Fisica Superiore.
ANALYSIS OF EXTINCTION CURVES TOWARDS THE SCO OBI ASSOCIATION c89
S. Aiello, B. Barsella (Pisa Univ., Italy), and A. Bonetti *In* ESA 3rd European IUE Conf. Jun. 1982 p 371-373 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV extinction curves of stars in SCO OBI were analyzed, using different dust models. The first model uses a continuous size distribution; in the second one, single radii for each kind of particle are considered. In both cases, spherical, inorganic, bare particles are considered. The possibility of discriminating among various size distributions was considered. Neither model adequately matches the curves in the whole wavelength range.
Author (ESA)

N83-11960# Pisa Univ. (Italy). Ist. di Astronomia.
ANOMALOUS EXTINCTION IN THE CEPHEUS OB 3 ASSOCIATION c89
B. Barsella, N. Panagia (CNR, Bologna), and M. Perinotto *In* ESA 3rd European IUE Conf. Jun. 1982 p 375-377 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV extinction of the four brightest stars of the Cepheus OB 3 association was investigated. While the shape of the bump at 2200 A and the extinction at longer wavelengths are close to the mean interstellar curve, the behavior shortward of 2000 A is peculiar. A fit with theoretical extinction curves shows that a strong excess of graphite relative to silicates in the local component is required to explain observed extinction in the association.
Author (ESA)

N83-11961# European Space Agency, Madrid (Spain). IUE Observatory.
DUST PROPERTIES IN STELLAR GROUPS c90
P. Patriarchi, M. Perinotto (Osservatorio Astrofisico di Arcetri, Florence), and B. Barsella (Pisa Univ., Italy) *In its* 3rd European IUE Conf. Jun. 1982 p 379-380 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Interstellar extinction toward the Cas OB 6 association was analyzed. The mass ratio of graphite to silicates is larger than in the mean interstellar medium with values similar to those found in Cep OB 3. The effect cannot be ascribed to an homogeneous dust cloud in the association, but very likely is of a purely local (circumstellar) nature. Author (ESA)

N83-11962# Science Research Council, Chilton (England). Rutherford Appleton Lab.
INTERSTELLAR EXTINCTION IN ANOMALOUS REGIONS c90
J. C. Blades, L. A. Jacobs (University Coll., London), D. McNally (University Coll., London), W. B. Somerville (University Coll., London), and D. C. B. Whittet (Preston Polytechnic) *In* ESA 3rd European IUE Conf. Jun. 1982 p 381-382 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Low resolution IUE spectra were obtained at long and short wavelengths. Ultraviolet extinction in individual lines of sight, the strength of the 2200 feature, the form of the far ultraviolet rise in extinction in directions which have anomalous optical properties, strengths of diffuse interstellar bands, and polarization were studied. The results demonstrate the extent to which these optical and

ultraviolet properties can vary anomalously, independently of each other. Author (ESA)

N83-11963# Kapteyn Astronomical Lab., Groningen (Netherlands).
INTERSTELLAR LINES IN HIGH RESOLUTION IUE SPECTRA. PART 1: GRONINGEN DATA REDUCTION PACKAGE AND TECHNICAL RESULTS **c89**
D. P. Gilra, T. H. Pwa, E. M. Arnal, and J. deVries *In* ESA 3rd European IUE Conf. Jun. 1982 p 385-390 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

In order to process and analyze high resolution IUE data on a large number of interstellar lines in a large number of images for a large number of stars, computer programs were developed for 115 lines in the short wavelength range and 40 in the long wavelength range. Programs include extraction, processing, plotting, averaging, and profile fitting. Wavelength calibration in high resolution spectra, fixed pattern noise, instrument profile and resolution, and the background problem in the region where orders are crowding are discussed. All the expected lines are detected in at least one spectrum. Author (ESA)

N83-11964# Kapteyn Astronomical Lab., Groningen (Netherlands).
INTERSTELLAR LINES IN HIGH RESOLUTION IUE SPECTRA. PART 2: HIGHLIGHTS OF PRELIMINARY ASTRONOMICAL RESULTS **c90**
D. P. Gilra, T. H. Pwa, and E. M. Arnal *In* ESA 3rd European IUE Conf. Jun. 1982 p 391-397 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

A data reduction package was used to process IUE data on interstellar lines. Lines were classed as normal, ionized, neutral, excited, depleted, or molecule. Lines within each of these groups were plotted together in increasing wavelength order, and for two extractions of the same line, in decreasing order number. Analysis indicates that stellar factors in hot supergiants can easily be confused with interstellar lines. Data on Zeta Oph show serious discrepancies with Copernicus satellite data. It is suggested that Copernicus may have a background problem in the A1II and Fe II line regions. Author (ESA)

N83-11965# University Coll., London (England).
STUDIES OF INTERSTELLAR CO **c90**
W. B. Somerville, L. A. Jacobs, D. McNally, D. C. B. Whittet (Preston Polytechnic), and J. C. Blades (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 399-401 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

High resolution short wavelength IUE spectra of reddened early stars were used to determine interstellar CO, column densities. These were compared with CH, CH+, and CN from optical observations and with CO from microwave measurements. The abundance ratio of CO12 to CO13 is small, consistent with models in which the CO13 abundance in diffuse clouds is increased by exothermic fractionation. Author (ESA)

N83-11966# Queens Univ., Belfast (Northern Ireland).
HIGH VELOCITY GAS COMPONENTS ASSOCIATED WITH SUPERGIANT STARS AND INTERSTELLAR GAS **c90**
B. Bates, W. Brown-Kerr, and D. L. Giaretta (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 403-409 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ultraviolet spectral data on the variability of expanding shells, associated with mass loss from Beta Ori, are presented. Red shifted high velocity gas components (HVC) observed in the interstellar gas in the line of sight towards HD 212593 (4 Lac) are discussed. A partial mapping of this material was obtained. Data suggest that HVC velocity = 80 km/sec, n (H) = 100 to 300 per cu cm, electron density < 1/cu cm, and temperature = 1000 to 10,000 K. The strongest HVC feature may be associated with the intersection of galactic radio loops 1, 2, and 3. Author (ESA)

N83-11967# Science Research Council, Chilton (England). Rutherford Appleton Lab.
DEPLETION OF INTERSTELLAR ZINC **c90**
A. W. Harris, G. E. Bromage, and J. C. Blades *In* ESA 3rd European IUE Conf. Jun. 1982 p 411-413 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

High resolution IUE spectra were used to investigate the abundance of interstellar Zn along sight lines of up to 3 kpc in length. The results show that the relative gas-phase abundance of Zn is generally constant throughout the interstellar medium. A slight depletion relative to the solar abundance is indicated. Author (ESA)

N83-11968# University Coll., London (England). Dept. of Physics and Astronomy.
ELEMENT DEPLETIONS IN INTERSTELLAR GAS **c90**
A. P. Phillips, P. M. Gondhalekar (SRC, Chilton, England), and M. Pettini (Royal Greenwich Observatory, Hertsmonceaux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 415-420 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

High resolution IUE observations were analyzed to derive element depletions in low velocity interstellar gas toward several stars in the same region of sky. The results were combined with previous observations to determine how the level of depletion of a given element depends on present densities in the interstellar medium. The density dependence of depletions is found to vary from element to element; this variation is discussed in light of depletion models. Results indicate that sputtering of grains in interstellar shocks is important in determining element depletions. Author (ESA)

N83-11969# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
THE MONOCEROS LOOP: A SUPERNOVA REMNANT INTERACTING WITH THE ROSETTE NEBULAE **c90**
Alfred Vidal-Madjar, C. Laurent, Max Pettini (Royal Greenwich Observatory), Jacques A. Paul (CEA, Sacaly, France), and M. Oliver (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 421-425 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV spectra of HD 47240, a B1Ib star located behind the Monoceros Loop, was used to analyze the distribution and motion of interstellar matter in this region and to investigate the expanding nebula. Results reveal a galactic component that is related to the interstellar medium present in the galaxy between the Sun and the target star; a fast moving component that is linked to the receding part of the Monoceros Loop supernova remnant; and a peculiar component which is detected only in highly ionized species and has a rather high ratio CIV/SiIV. Comparison with other observations indicates that the Monoceros Loop is inside the Mon OB2 association and interacts directly with the nearby Rosette Nebula. This interaction is observed through the peculiar component. It is shown that the Loop is a supernova which exploded in a medium with density one tenth the standard. Author (ESA)

N83-11970# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
THE VIOLENT INTERSTELLAR MEDIUM ASSOCIATED WITH THE CARINA NEBULA **c90**
Claude Laurent, Jacques A. Paul (CEA, Saclay, France), and Max Pettini (Royal Greenwich Observatory) *In* ESA 3rd European IUE Conf. Jun. 1982 p 427-429 refs Document also announced as A82-42093 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The physical conditions and chemical composition of the interstellar medium in line to HD 93205, an O3V star in the Great Carina Nebula, were studied, using UV spectra. The two main high velocity components show different relative abundance patterns. The red shifted component shows no depletion. For the

blue shifted component, the relative abundance pattern seems difficult to explain in terms of elements locked into grains. Its composition is attributed to mixing with freshly synthetized material ejected by a recent supernova explosion. One low velocity component is identified with the normal interstellar gas in the disk of the Galaxy. In this component, column densities of interstellar CIV and SiIV, free from contamination by circumstellar material, were measured. The other low velocity component is identified with the approaching part of the expanding ionized nebula around the Carina OB associations. It consists of a dense HII region in which the two conspicuous OI fine structure lines originate.
Author (ESA)

N83-11971# University Coll., London (England).
INTERSTALLAR GAS IN THE DIRECTION OF THE LARGE MAGELLANIC CLOUD c90
D. Maslen, A. J. Willis, R. Wilson, K. Nandy (Royal Observatory, Edinburgh), and J. C. Blades (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 431-433 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

All the IUE spectra of HD 38282 were co-added and combined with high resolution optical observations of CaII in order to investigate the distribution of material along the line of sight to the star. Abundances relative to neutral hydrogen imply a zinc underabundance, and an overall metal underabundance of 0.5 dex in the Large Magellanic Cloud (LMC). Reddening in the LMC along this line of sight is < 0.1. With an estimated error of 0.2 dex in the HI column density, a lower limit on the LMC component of 2 times 10 to the 21st power atoms/sq cm in the line to HD 38282 is estimated. This yields a lower limit for N(HI)/E(B-V) which is larger by a factor of four than the average galactic value, but is comparable with the value towards the central star of 30 Dor. Author (ESA)

N83-11972# University Coll., London (England). Dept. of Physics and Astronomy.
HIGHLY IONIZED GAS IN THE GALACTIC HALO c90
Kym A. West and Max Pettini (Royal Greenwich Observatory, Hertsmonceaux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 435-437 refs Document also announced as N82-31220 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Results of a study of CIV, Si IV and NV interstellar absorption lines in IUE spectra of distant early stars in the halo of our galaxy are summarized. The study detected CIV and Si IV lines towards approximately two-thirds of the sample of 24 stars. The NV line, however, is only detected towards two stars. Author (ESA)

N83-11973# Science Research Council, Chilton (England). Rutherford Appleton Lab.
DISTRIBUTION OF GAS IN THE HALO OF THE GALAXY c90
J. C. Blades, L. L. Cowie (MIT), D. C. Morton (Anglo-Australian Observatory), D. G. York (Princeton Univ.), and C-C. Wu (Computer Sciences Corp.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 439-440 refs Document also announced as N82-31219 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Results from a high resolution, ultraviolet study of interstellar gas situated away from the plane of our Galaxy, using the nuclei of Seyfert galaxies MKn 509 and F9 as background probes, are presented. In these directions, low velocity galactic gas as well as two extragalactic clouds, one probably associated with the Magellanic Stream and the other with Mkn 509, were detected. These data combined with results from other lines of sight show that the ultraviolet species extend about 10 kpc from the plane, assuming the high latitude gas corotates with the galactic disk.
Author (ESA)

N83-11974*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE SPECTRUM OF COMETS AS DERIVED FROM IUE OBSERVATIONS c91
M. C. Festou (CNRS, Verrieres-le-Buisson, France), P. D. Feldman (John Hopkins Univ., Baltimore), H. A. Weaver, and H. U. Keller (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* ESA 3rd European IUE Conf. Jun. 1982 p 445-449 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Eight comets were observed with the IUE at various heliocentric and geocentric distances. Their UV spectra are remarkably similar despite the large differences in the dust to gas ratios. Since all the dominant atomic species (except N) radicals and ions of the coma are detected in this spectral region, the total gaseous output of the nucleus can be estimated. The abundance of the carbon atom-bearing species is still not very well known and there are indications that the CO content of the coma could vary from comet to comet. Author (ESA)

N83-11975# University Coll., Cardiff (Wales). Dept. of Applied Mathematics and Astronomy.
COMETS MADE OF H2O ICE c91
Max K. Wallis *In* ESA 3rd European IUE Conf. Jun. 1982 p 451-453 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The icy comet hypothesis is reviewed and sublimating icy models are discussed. The heliocentric dependence of OH band intensities in comet Bradfield (1979 X) in the near UV is significantly steeper than expected for H2O ice over 0.7 to 1.4 AU. Sublimating icy comets give an index $n < 2.2$ in the dependence r to the minus n power, where r = heliocentric distance. The H 1216A and O 1304A heliocentric variations in comet Bradfield give uncertain indications, while the observed (O) 2972A emission at 0.7 AU can be explained by CO2 photodissociation. The index $n = 3.5$ to 4, therefore, implies less volatile outgassing material than H2O, primarily of organic composition. Author (ESA)

N83-11976# Bonn Univ. (West Germany). Physikalisches Inst.
AMMONIA IN THE JOVIAN STRATOSPHERE: A COMPARISON OF PHOTOCHEMICAL CALCULATIONS WITH IUE OBSERVATIONS c91
K. H. Fricke, U. vonZahn, M. Combes (Observatoire de Meudon, France), and T. Encrenaz (Observatoire de Meudon, France) *In* ESA 3rd European IUE Conf. Jun. 1982 p 455-461 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Several bands of the 2168 A electronic transition of ammonia were identified in the Jovian stratosphere by IUE. Vertical distributions of ammonia were generated for two temperature profiles and a range of eddy coefficients, using one dimensional, steady state, photochemical models. Good agreement with the observed reflectivities is found for an eddy coefficient of 1 to 3 times 10 to the 13th power/(n sq root n) sqcm per sec, where the total number density n is measured as molecules per cm. This value, as well as that derived from Voyager methane data, implies a remarkable similarity for the magnitude of eddy transport in the Jovian upper atmosphere with that in the atmospheres of the terrestrial planets. Author (ESA)

N83-11977# Bonn Univ. (West Germany). Physikalisches Inst.
OBSERVATION OF THE LYMAN-ALPHA ALBEDO OF URANUS c91
K. H. Fricke and J. Darius (Science Museum, London) *In* ESA 3rd European IUE Conf. Jun. 1982 p 463-469 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The Lyman alpha emission from Uranus was measured by IUE. The effective geometric albedo sets a lower limit of 0.5 ppm for the hydrocarbon mixing ratio in the high upper stratosphere as well as an upper limit on the atomic hydrogen column density of 10 to the 16th power/sqcm above the methane layer. In conjunction with IR temperature determinations of the Uranian stratosphere, it is most likely that the observed Lyman alpha emission is due only to resonance scattering on H atoms above the mixing region of the atmosphere. Author (ESA)

N83-11978*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CURRENT NASA STUDIES FOR A FAR ULTRAVIOLENT SPECTROGRAPHIC EXPLORER (FUSE) **c89**
J. Linsky (Joint Inst. for Lab. Astrophysics), A. Boggess, S. Bowyer (California Univ., Berkeley), J. Caldwell (New York State Univ., Stony Brook), W. Cash (Colorado Univ., Boulder), J. Cohen (California Inst. of Tech., Pasadena, Calif.), A. Dupree (Harvard Univ., Mass.), R. Green (Arizona Univ. Tuscon), E. Jenkins (Princeton Univ., N. J.), M. Jura (California Univ., Los Angeles) et al *In* ESA 3rd European IUE Conf. Jun. 1982 p 473-485 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01 CSCL 03A

The NASA plans for FUSE, a satellite which obtains spectra with resolutions between 100,000 and 100 in the spectral regions from 912 to 1216A and 100 to 912A, are outlined. Scientific problems which can be tackled by FUSE, but not by IUE or the Space Telescope, are discussed. A grazing incidence echelle and a hybrid echelle design are presented. They have high throughput, large simultaneous spectral range, and low background photon counting statistics. The satellite operational organization is similar to that of IUE. Author (ESA)

N83-11979# European Space Research and Technology Center, Noordwijk (Netherlands). Space Science Dept.
MAGELLAN: FAR AND EXTREME ULTRAVIOLET SPECTROGRAPHIC OBSERVATORY **c89**
S. diSeregoAlighieri *In* ESA 3rd European IUE Conf. Jun. 1982 p 491-495 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The ESA Magellan project, designed to provide high resolution spectra (greater than 25,000) between 500 and 1500A of galactic and extragalactic objects with $V < 16$ M, is outlined. The instrument consists of a mechanical collimator, a concave holographic grating and a bidimensional photon counting detector. A low resolution mode provides spectra of objects as faint as 18.5 M. Magellan is planned as an observatory, operated in real time, and allowing interaction with the observer. Author (ESA)

N83-11980# Osservatorio Astronomico, Trieste (Italy).
EXOTIC STELLAR OBJECTS: RESEARCH DIRECTIONS FOR THE PROPOSED SATELLITE MAGELLAN **c90**
M. Hack *In* ESA 3rd European IUE Conf. Jun. 1982 p 497-501 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The importance of Magellan observing peculiar stellar objects, young contracting stars or far-evolved objects is discussed. Magellan could observe the EUV spectrum of white dwarfs, chromospheres and coronae of red dwarfs and especially flare stars, chromospheres and coronae of about 20 main sequence stars in the spectral range AO/K5, and could detect neutron stars and measure their continuous spectrum. In the spectral range from 913 to 1500A, it could provide data on nebular variables, flare stars, cataclysmic variables, hot subdwarfs and white dwarfs, interacting binaries, and late giants and supergiants. Author (ESA)

N83-11981# Observatoire de Meudon (France).
THE INTEREST OF OBSERVING MAIN SEQUENCING OBJECTS WITH MAGELLAN **c89**
Francoise Praderie *In* ESA 3rd European IUE Conf. Jun. 1982 p 503-505 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Observations of main sequence stars between 500 and 1400A at very high spectral resolution are proposed. In the photosphere, Magellan satellite could examine autoionization lines, abundance of rare elements, satellite lines, and Schuster mechanism effects. It could investigate where the Lyman continuum is formed in the chromosphere, and how radiative losses envolve from cool to hot stars. Magellan could also help to establish links between the different types of stellar wind accelleration mechanism over the Hertzsprung-Russell diagram. Author (ESA)

N83-11982# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
OBSERVATIONS IN THE SOLAR SYSTEM WITH THE PROPOSED EARTH-ORBITING OBSERVATORY MAGELLAN **c89**
R. Prange *In* ESA 3rd European IUE Conf. Jun. 1982 p 507-512 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The advantages of Earth orbiting observatories are outlined, taking investigation of the Jupiter-Io system as an example. The instrument requirements of such observatories are considered. Their wavelength range should be from 300 to 3000A with spectral resolution of a few hundredth A, and spatial resolution on the order of 1 arcsec. Their field of view and spatial resolution make simultaneous mapping of any extended system possible in a reasonable time for monochromatic emission lines and thus allow temporal survey. The spectral wavelength range and spectral resolution give access to the atomic (neutral and ionized) composition and thermodynamics. Author (ESA)

N83-11983# European Space Agency, Madrid (Spain). IUE Observatory.
OPTICAL AND ULTRAVIOLET SPECTROPHOTOMETRY OF GLOBULAR CLUSTERS IN THE MAGELLANIC CLOUDS **c90**
C. Cacciari, F. Fusi-Pecci (Bologna Univ.), C. Zavanori (Bologna Univ.), K. C. Freeman (Australian National Univ.), A. Cassatella, P. Benvenuti, L. Bianchi, A. Heck, P. Patriarchi, and W. Wamsteker *In its* 3rd European IUE Conf. Jun. 1982 p 519-522 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

In order to verify whether a second parameter besides metallicity affects horizontal branch (HB) morphology in the Magellanic Clouds (MC), and to study the population content in the MC globulars, several clusters were observed by IUE. Optical spectra were aslo obtained for eight of the clusters. Comparison with ANS data confirms the differences in the formation and dynamics between the Galaxy and the Magellanic Clouds. A synthetic spectrum for cluster NGC 2019 was calculated, using HB morphologies which take mass loss and core rotation into account. A good fit to observation data is obtained for a model with age 13 billion years. Author (ESA)

N83-11984# European Space Agency, Madrid (Spain). Astronomy Div.
OPTICAL AND ULTRAVIOLET OBSERVATIONS OF THE X-RAY GLOBULAR CLUSTER BO 158 IN M31 **c89**
C. Cacciari, A. Casatella, L. Bianchi, F. Fusi-Pecci (Osservatorio Astronomico, Bologna), and R. G. Kron (Yerkes Observatory, Wis.) *In its* 3rd European IUE Conf. Jun. 1982 p 525-528 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Medium resolution optical spectra, two IUE low resolution ultraviolet spectra, and optical data were used to determine the population content of Bo 158. Optical, UV and X-ray fluxes are all consistent with those derived for the X-ray globulars in the Galaxy. The ratio of the fluxes at 3000 and 1500 A suggests for Bo 158 a morphology of the HR diagram with an extremely blue horizontal branch. However, the values for metallicity and intrinsic color suggest a red horizontal branch. This discrepancy may indicate that the second parameter phenomenon is present among M31 globular clusters. Author (ESA)

N83-11985# European Space Agency, Madrid (Spain). Astronomy Div.
COORDINATED OBSERVATIONS OF SEYFERT 1 GALAXIES **c89**
W. Wamsteker, P. Benvenuti, C. Cacciari, A. Cassatella, L. Bianchi, P. Patriarchi, J. C. Blades (SRC, Chilton, England), and A. C. Danks (ESO, La Silla, Chile) *In its* 3rd European IUE Conf. Jun. 1982 p 529-531 refs Document also announced as N82-31180 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Instantaneous line profiles of UV and optical recombination

lines of F9 and AKN 120 are given. Models of Seyfert nuclei are discussed. The hydrogen recombination lines show a systematically narrower profile for recombination between lower levels. Single cloud models cannot account for this, so a multiple cloud model, featuring systematic rotation and a strong increase in electron density towards the center of rotation, is posited. Author (ESA)

N83-11986# Science Research Council, Chilton (England). Astrophysics Group.
RESULTS FROM THE NGC 4151 ULTRAVIOLET LABORATORY **c89**
G. E. Bromage, A. Boksenberg (Royal Greenwich Observatory), J. Clavel (Observatoire de Meudon, France), A. Elvius (Stockholm Univ.), M. V. Penston (Royal Greenwich Observatory), G. C. Perola (Rome Univ.), M. Pettini (Royal Greenwich Observatory), M. A. J. Snijders (University Coll., London), E. G. Tanzi (CNR, Milan), M. Tarenghi (ESO) et al *In* ESA 3rd European IUE Conf. Jun. 1982 p 533-536 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV continuum, absorption lines, and emission lines of NGC 4151 were extracted from IUE data. The continuums at all epochs are characterized by the long wave power law flux at 2500 A, the spectral index of the power law, and excess at the 1455 A continuum window. Absorption is deduced to occur within a detached shell outside the BLR 2 region, but within BLR 3. Absorbing region thickness is < 1% of its distance from the central object. The strong emission lines each show different widths, except for the very low state, when all lines are relatively narrow. Author (ESA)

N83-11987# Observatoire de Meudon (France). Lab. d'Astrophysique.
MONITORING THE UV SPECTRUM OF THE SEYFERT 1 GALAXY NGC 4593 II: SHORT TERM VARIABILITY **c89**
J. Clavel *In* ESA 3rd European IUE Conf. Jun. 1982 p 537-541 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The UV spectrum of NGC 4593 was observed twice at an interval of 9 days. Significant variations are found both in the line and the continuum which yield an upper limit to the size of the broad line region < 2 times 10 to the 16th power cm. Several correlations are found, in particular between the intensity and the spectral index of the power law continuum at 2500 A. The short wavelength flux excess present in earlier data vanished in 1981. Emission line intensities are in general correlated with that of the continuum, with the high excitation lines showing the strongest variations. Author (ESA)

N83-11988# Stockholm Univ. (Sweden).
NGC 7469, A SEYFERT 1 GALAXY OBSERVED WITH IUE **c89**
Aina Elvius, B. A. M. Westin, and J. Lind (Lund Observatory, Sweden) *In* ESA 3rd European IUE Conf. Jun. 1982 p 543-548 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE data on NGC 7469 for different epochs between June 1978 and May 1981 were compared, as were data for NGC 7469 and other galaxies. The dereddened continuum, harder in 1978 than in 1981, can be fitted to a straight line indicative of a one component nonthermal source. Emission lines show variation. Several weak absorption lines are present. Absorbing clouds have negative velocities relative to the systemic velocity and thus indicate outward motions. Velocities observed in emission and absorption may be due to a rotating, expanding flow. Author (ESA)

N83-11989# European Southern Observatory, Munich (West Germany).
LINE PROFILES AND CONTINUUM RADIATION IN SEYFERT GALAXIES **c90**
C. Boisson and M. H. Ulrich *In* ESA 3rd European IUE Conf. Jun. 1982 p 549-550 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The existence of general spectral properties common to all Seyfert 1 nuclei is considered. The IUE, and other UV data, indicate that in variable Seyfert nuclei the UV continuum is always harder when it is brighter. The full width at half maximum of CIII 1909 A is often found to be smaller than that of CIV 1550 A, in contrast with quasars where these lines appear with identical profiles. Author (ESA)

N83-11990# University Coll., London (England). Dept. of Physics and Astronomy.
SECONDARY ULTRAVIOLET SOURCES IN THE SEYFERT 2 GALAXY NGC 1068 **c90**
M. A. J. Snijders, S. A. Briggs, and A. Boksenberg (Royal Greenwich Observatory, Herstmonceux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 551-557 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Four UV sources were discovered by IUE around the nucleus of NGC 1068. All coincide with the inner spiral arms, and three of them can be explained by the integrated light of large numbers of O and B type stars associated with the spiral arms. These three sources have a continuum flux of 10% to 20% of the Seyfert nucleus. The fourth source has a harder spectrum then the Seyfert nucleus itself and at 1350 A its observed continuum flux is 70% of the Seyfert continuum. The estimated position is close to the brightest optical knot in the NW inner spiral arm at 11 sec from the nucleus in position angle 332 deg. The unusual ultraviolet brightness and shallow P Cygni type profiles of this source resemble the starburst galaxy NGC 7714. Author (ESA)

N83-11991# University Coll., London (England). Dept. of Physics and Astronomy.
IUE OBSERVATIONS OF NGC 3783 **c89**
P. Barr *In* ESA 3rd European IUE Conf. Jun. 1982 p 559-563 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Low resolution IUE observations of Seyfert NGC 3783 performed at 16 epochs between 1978 and 1982 are presented. Variations are encountered in the line of sight extinction, the emission line strengths, the underlying continuum intensity and the spectral index. A highly significant correlation between spectral index and luminosity, indicative of synchrotron UV emission, is reported. The dominant heating and cooling mechanisms in the continuum emission region are most likely Fermi acceleration and relativistic brehmsstrahlung damping. Author (ESA)

N83-11992# European Space Agency, Madrid (Spain). Satellite Tracking Station.
MARKARIAN 108, A TIDALLY-TORN OFF OR TURNED ON GALAXY **c90**
P. Benvenuti, C. Casini (Milan Univ.), and J. Heidmann (Observatoire de Paris) *In its* 3rd European IUE Conf. Jun. 1982 p 565-567 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Low resolution IUE spectra of Mk 108 were studied to see if an H1 gas cloud was accelerated away from a neighboring galaxy to form Mk 108, or whether the cloud is associated with a dwarf galaxy now undergoing a burst of star formation seen as Mk 108. The UV continuum can be fitted to a mixture of 5000 main sequence and supergiant stars, but their optical luminosity is only a fraction of that of Mk 108. The IUE data show that Mk 108 recently underwent a very large burst of star formation, but initial mass function and absorption data are necessary to understand ongoing processes. Author (ESA)

N83-11993# University Coll., London (England).
LY ALPHA ABSORPTION AT CZ = 8200 KM/SEC IN NGC 1275 **c89**
S. A. Briggs, M. A. J. Snijders, and A. Boksenberg (Royal Greenwich Observatory) *In* ESA 3rd European IUE Conf. Jun. 1982 p 569-571 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The origin of the NGC 1275 Lyman alpha absorption feature

is discussed. The IUE spectrophotometric data are used to attribute the origin of this feature to the intervening galaxy responsible for the high velocity system of filamentary emission seen around NGC 1275. Profile fitting yields a hydrogen column density in the absorbing material of 1.8 times 10 to the 20th power atoms/sq cm. Combining this result with 21 cm absorption data yields a spin temperature 50 K for the absorbing gas. The temperature and density data confirm that the cloud would be destroyed by the nuclear X-ray source, unless it were hundreds of kpc from the center of NGC 1275. The lack of shock heating by the intracluster medium through which the cloud passes suggests that the medium is at least two orders of magnitude less dense than the cluster center, i.e., they are hundreds of kpc apart. Author (ESA)

N83-11994# Science Research Council, Chilton (England). Rutherford Appleton Lab.
THE ULTRAVIOLET SPECTRUM OF THE HIGH RED SHIFT BL LAC OBJECT 0215+015 **c89**
J. C. Blades, M. Pettini (Royal Greenwich Observatory), R. W. Hunstead (Sydney Univ.), and H. S. Murdoch (Sydney Univ.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 573-575 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The hydrogen Lyman lines of the red shift systems in BL Lac 0215 + 015 were studied by combining three low dispersion IUE spectra. Lyman alpha lines are identified from four of the red shift systems. In the Z sub a = 1.649 system, Lyman beta, gamma and delta lines are noted. Features attributed to zero red shift, galactic MgII and FeII are present. Column densities for six ionic species in the Z sub a = 1.345 system are similar to those for halo, galactic gas in a Large Magellanic Cloud sightline, implying that the system arises in an intervening galaxy in the line of sight to 0215 + 015. Uncertainties in abundance profile determination cause overestimates in H1, and underestimates in ion column densities. Author (ESA)

N83-11995# New York Univ., New York. Dept. of Physics.
MULTIFREQUENCY OBSERVATIONS OF THE OPTICALLY VIOLENT VARIABLE QUASAR 1156 + 295 **c90**
A. E. Glassgold, J. N. Bregman, and P. J. Huggins *In* ESA 3rd European IUE Conf. Jun. 1982 p 577-580 refs Document also announced as N82-31188 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

A large outburst in the quasar 1156+295 in which B increased to 13.2 M is discussed. Short and long wavelength spectra were obtained on three occasions when the object was very bright, and which were separated by intervals of 4 and 60 days. The UV continuum in all cases is a power law with slope close to -2.0. No spectral features are apparent in the UV. Observations were made at radio, infrared, and optical frequencies within hours of IUE measurements. The overall multifrequency spectra become progressively less steep as the wavelength increases, and probably turn over in the far infrared. The shape of the spectrum changes little at optical and ultraviolet wavelengths. Author (ESA)

N83-11996# Milan Univ. (Italy). Ist. di Fisica.
UV OBSERVATIONS OF X-RAY EMITTING QSO'S AND BL LAC OBJECTS **c89**
L. Chiappetti, L. Maraschi, E. G. Tanzi (CNR, Milan), and A. Treves *In* ESA 3rd European IUE Conf. Jun. 1982 p 581-587 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

The IUE observations of the BL Lac Objects PKS 2155-304, PKS 0521-37, PKS 0537-44 and of the QSOs PG1351+64 and PKS 0637-75 are discussed. For PKS 2155-304 and PG 1351+64, comparison of UV and optical continua indicates a steepening of the spectrum around 3000 A. For 3C66A, a steepening is found with respect to the infrared data while the optical slope varies between that of the infrared and that of the ultraviolet data. For PKS 0521-37 the data corrected for the contribution of the underlying galaxy are compatible with a single power law from 10 to the 14th power to 3 times 10 to the 15 th power Hz. In all cases the extrapolation of the UV spectrum is compatible with the observed soft X-ray fluxes. Since PKS 0537-44 and PKS 0637-75 were observed in only one of the IUE bands, it is not possible to estimate reliably a UV spectral index. Author (ESA)

N83-11997# New York Univ., New York. Dept. of Physics.
SIMULTANEOUS MULTIFREQUENCY OBSERVATIONS OF BL LAC OBJECTS AND VIOLENTLY VARIABLE QUASARS **c89**
J. N. Bregman, A. E. Glassgold, and P. J. Huggins *In* ESA 3rd European IUE Conf. Jun. 1982 p 589-591 refs Document also announced as N82-31187 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Ultraviolet spectra simultaneous with radio, infrared, optical, and X-ray measurements were obtained for 0735+178, BL Lac, IZw-187, and 3C466. These spectra indicate that the synchrotron emission probably becomes optically thick in the mm or far infrared region. The IR-UV continua of 0735+178 and IZw-187 are simple power laws of slope near unity. In contrast, the continua in BL Lac and 3C446 steepen sharply between the IR and UV regions. This implies that the electron distribution is sharply cut off at some maximum energy. The X-ray emission in BL Lac, 3C446, and 0735+178 is probably produced by the inverse Compton process. However, synchrotron radiation is the probable source of X-ray emission in the X-ray bright BL Lac object IZw-187.
Author (ESA)

N83-11998# Manchester Univ. (England). Dept. of Astronomy.
THE FORMATION OF THE BROAD EMISSION LINE REGIONS IN QSOS **c89**
J. E. Dyson and J. J. Perry (Max-Planck Inst. fuer Radioastronomie) *In* ESA 3rd European IUE Conf. Jun. 1982 p 595-597 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

It is suggested that the shock waves in hypersonic optically thin quasar winds are bow shocks produced by obstacles in the wind, e.g., supernovae. These waves produce post shock regions where strong Compton cooling occurs, characterized by broad emission line regions. Since the gas behind a bow shock retains a substantial fraction of the inflow velocity, there is no need to invoke a cloud acceleration process. The cooled gas forms numerous small optically thick condensations as a result of thermal instability. A supernova rate of 0.1 to 10/yr can provide the large number of clouds which must exist. Author (ESA)

N83-11999# Technische Hochschule, Vienna (Austria). Inst. of Astronomy.
THE IUE SPECTRA OF ET AND: THEIR REDUCTION AND VARIATION **c89**
M. Barylak *In* ESA 3rd European IUE Conf. Jun. 1982 p 601-607 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Seventeen IUE spectra (nine from 1200 A to 2000 A and eight from 1900 A to 3200 A of the chemically peculiar star ET And (HR8861) were studied within the Tololo-Vienna interactive image processing system. While using the Fourier routines of this system, filtering, deconvolution of instrumental profiles and determination of the rotational velocity could be applied to the IUE spectra under investigation. A method which detects spectral line variations was developed. Author (ESA)

N83-12000# Vrije Universiteit, Brussels (Belgium). Inst. of Astrophysics.
STELLAR WINDS **c90**
C. DeLoore *In* ESA 3rd European IUE Conf. Jun. 1982 p 611-614 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

Knowledge on mass loss rates, the dependence of the mass loss rates on the stellar parameters luminosity, mass, and radius, and velocity laws is summarized. Mass loss rates, derived from ultraviolet data, the variability of the mass loss, episodic mass loss, and two component models, are discussed. The importance

of the ionization fractions for the determination of the mass loss rates is stressed. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-12001# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.
THE COMPUTER PROGRAM ILLUM: CALCULATION OF THE POSITIONS OF THE SUN AND MOON AND THE NATURAL ILLUMINATION
A. C. vanBochove Apr. 1982 99 p refs
(PhL-1982-13; TDCK-76390) Avail: NTIS HC A05/MF A01

The computer program ILLUM is described and listed. This program calculates azimuth and altitude of the Sun and of the Moon with an accuracy of 1 arcmin. The input data are the geographical longitude and latitude and the local mean solar time. Natural illuminance on a horizontal plane, caused by the Sun or by the Moon, is calculated for a clear sky. Author (ESA)

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N83-11895# Astronomical Inst., Utrecht (Netherlands). Space Research Lab.
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N83-11920# Institut d'Astrophysique, Paris (France).
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N83-11928# European Space Agency, Madrid (Spain). IUE Observatory.
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N83-11930# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
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N83-11931# Commissariat a l'Energie Atomique, Saclay (France). Section d'Astrophysique.
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J. M. Bonnet-Bidaud, M. Mouchet (Observatoire de Meudon, France), and C. Motch (ESO, Munich) *In* ESA 3rd European IUE Conf. Jun. 1982 p 241-244 refs Sponsored by ESO (For primary document see N83-11889 02-88)
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N83-11932# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
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N83-11938# Landessternwarte auf dem Koenigstuhl, Heidelberg (West Germany).
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N83-11940# Universidad Nacional Autonoma de Mexico, Mexico City.
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N83-11955# Max-Planck-Institut fuer Astrophysik, Munich (West Germany).
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N83-11958# Warsaw Univ. Observatory (Poland).
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N83-11963# Kapteyn Astronomical Lab., Groningen (Netherlands).
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N83-11978*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
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N83-11979# European Space Research and Technology Center, Noordwijk (Netherlands). Space Science Dept.

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N83-11981# Observatoire de Meudon (France).
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N83-11982# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
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C. Cacciari, A. Casatella, L. Bianchi, F. Fusi-Pecci (Osservatorio Astronomico, Bologna), and R. G. Kron (Yerkes Observatory, Wis.) *In its* 3rd European IUE Conf. Jun. 1982 p 525-528 refs (For primary document see N83-11889 02-88)
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N83-11985# European Space Agency, Madrid (Spain). Astronomy Div.
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W. Wamsteker, P. Benvenuti, C. Cacciari, A. Cassatella, L. Bianchi, P. Patriarchi, J. C. Blades (SRC, Chilton, England), and A. C. Danks (ESO, La Silla, Chile) *In its* 3rd European IUE Conf. Jun. 1982 p 529-531 refs Document also announced as N82-31180 (For primary document see N83-11889 02-88)
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N83-11986# Science Research Council, Chilton (England). Astrophysics Group.
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N83-11987# Observatoire de Meudon (France). Lab. d'Astrophysique.
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N83-11988# Stockholm Univ. (Sweden).
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N83-11991# University Coll., London (England). Dept. of Physics and Astronomy.
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N83-11994# Science Research Council, Chilton (England). Rutherford Appleton Lab.
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J. C. Blades, M. Pettini (Royal Greenwich Observatory), R. W. Hunstead (Sydney Univ.), and H. S. Murdoch (Sydney Univ.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 573-575 refs (For primary document see N83-11889 02-88)
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L. Chiappetti, L. Maraschi, E. G. Tanzi (CNR, Milan), and A. Treves *In* ESA 3rd European IUE Conf. Jun. 1982 p 581-587 refs (For primary document see N83-11889 02-88)
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N83-11997# New York Univ., New York. Dept. of Physics.
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J. N. Bregman, A. E. Glassgold, and P. J. Huggins *In* ESA 3rd European IUE Conf. Jun. 1982 p 589-591 refs Document also announced as N82-31187 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11998# Manchester Univ. (England). Dept. of Astronomy.
THE FORMATION OF THE BROAD EMISSION LINE REGIONS IN QSOS
J. E. Dyson and J. J. Perry (Max-Planck Inst. fuer Radioastronomie) *In* ESA 3rd European IUE Conf. Jun. 1982 p 595-597 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11999# Technische Hochschule, Vienna (Austria). Inst. of Astronomy.
THE IUE SPECTRA OF ET AND: THEIR REDUCTION AND VARIATION
M. Barylak *In* ESA 3rd European IUE Conf. Jun. 1982 p 601-607 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-12002# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALYSIS OF INTERSTELLAR DUST BY UBVR POLARIMETRY [ANALISE DA POEIRA INTERSTELAR ATRAVES DA POLARIMETRIA UBVR]
Thyrso Villela Neto and Sayd J. Codina Landaberry Jul. 1982 18 p refs In PORTUGUESE; ENGLISH summary Presented at the 9th Ann. Reunion of the Brazilian Soc. of Astronomy, Sao Paulo Sponsored in part by CNPq and FINEP
(INPE-2484-PRE/168) Avail: NTIS HC A02/MF A01

It is noted that the study of the linear interstellar polarization, using the parameters (P max, lambda max, and K) of the

Serkowski's empirical relation, can give elements for the comprehension of the interstellar medium and, hence, of the interstellar grains of dust which are the polarizers. The parameters P max and lambda max are related to the column density and the grains dimensions, respectively. A characterization of the parameter K with the properties of interstellar medium, presented through a simultaneous determination of the three parameters is discussed. It is concluded that no simple correlation can be obtained if UBVR polarimetry is used, and a large number of points are required.
M.G.

N83-12003# Naval Research Lab., Washington, D. C.
S-201 CATALOG OF FAR-ULTRAVIOLET OBJECTS, REVISED Final Report
Thorton Page, George R. Carruthers, and Harry M. Heckathorn 6 May 1982 229 p refs
(RR0340642)
(AD-A115772; NRL-8487) Avail: NTIS HC A11/MF A01 CSCL 03/2

A catalog of star images was compiled from images obtained by the NRL Far-Ultraviolet Camera/Spectrograph (Experiment S201), operated from 21 to 23 April 1972 on the lunar surface during the Apollo-16 mission. These images were scanned on a microdensitometer, and the output was recorded on magnetic tapes. A set of seven computer programs was written to process these recorded outputs in order to compile the catalog. The catalog is divided into 11 parts, covering ten fields in the sky (the Sagittarius field being covered by two parts), and each part is headed by a constellation name and the field center coordinates. The errors in position of the detected images are less than about 3 arc-min. Correlations are given with star numbers in the Smithsonian Astrophysical Observatory catalog, and star images detected on two or more S201 frames which do not corresponds to SAO stars are listed. The Revised Catalog differs from the first edition (NRL Report 8173, 20 January 1978) in that the brightnesses of all detected objects have been placed on an absolute scale of UV magnitudes based on instrument preflight calibrations. These magnitudes are compared with expectations based on theoretical model atmospheres and with calibrated OAO-2 observations of stars in common. The text includes discussions of the data analysis procedures and discussions of some results for nonstellar objects of special interest. The Revised S201 Catalog is also available on a single reel of seven-track magnetic tape.
Author (GRA)

N83-12004# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
PROCESSING AND EVALUATION OF THE DATA FROM THE PLASMA EXPERIMENT ONBOARD THE HELIOS SOLAR PROBES Final Report, Nov. 1981
Rainer Schwenn and Helmut Rosenbauer Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 204 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-002; ISSN-0170-1339) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,50

The data processing and evaluation procedure for the plasma experiment on board the HELIOS solar probes is described. The instruments of the HELIOS plasma experiment investigate the interplanetary plasma characteristics. Most of the intermediate data processing steps are explained and the resulting data plots are shown in their various forms. The most important computer programs are enclosed, together with basic explanations.
Author (ESA)

N83-12005# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
DATA PROCESSING AND RESULTS OF THE ZODIACAL LIGHT EXPERIMENT E9 ON HELIOS A AND B Final Report, Dec. 1981
Christoph Leinert, Ingrid Richter, Martha Hanner, Ivan Mistrik, Moffawak AlMakadsi, and Bernd Planck Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 115 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-007; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24

The method used to derive the spatial distribution of interplanetary dust and the results are presented. A complete list of literature, concerning this experiment, is included. The radial gradients of the spatial distribution, and the node and inclination of the symmetry plane of interplanetary dust are reliably determined. Zodiacal light is remarkably constant and variations other than these caused by the Helios orbital motion were not observed. Data on light intensity and polarization of the Milky Way Galaxy were also obtained.
Author (ESA)

N83-11891# Vrije Universiteit, Brussels (Belgium). Inst. of Astrophysics.
STELLAR EVOLUTION AFTER IUE. PART 1: MASSIVE STARS DURING CORE HYDROGEN BURNING AND MASSIVE CLOSE BINARIES
C. deLoore and A. Maeder (Geneva Observatory) *In* ESA 3rd European IUE Conf. Jun. 1982 p 15-20 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11892# Geneva Observatory (Switzerland).
STELLAR EVOLUTION AFTER IUE. PART 2: A RENEWAL FOR MASSIVE STARS AND WOLF-RAYET (WR) STARS
Andre Maeder (Vrije Univ., Brussels) and Camille deLoore *In* ESA 3rd European IUE Conf. Jun. 1982 p 21-29 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11893# Consiglio Nazionale delle Ricerche, Bologna (Italy). Inst. di Radioastronomia.
ULTRAVIOLET PROPERTIES OF SUPERNOVAE
N. Panagia *In* ESA 3rd European IUE Conf. Jun. 1982 p 31-36 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11897# Padua Univ. (Italy). Asiago Astrophysical Observatory.
STELLAR POPULATIONS IN NORMAL GALAXIES
Massimo Capaccioli *In* ESA 3rd European IUE Conf. Jun. 1982 p 59-68 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11901# Landessternwarte auf dem Koenigstuhl, Heidelberg (West Germany).
T TAURI STARS: NOT ONE BUT TWO TRANSITION REGIONS
Claude Bertout *In* ESA 3rd European IUE Conf. Jun. 1982 p 89-94 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11904# Observatoire de Meudon (France).
CONTRIBUTION TO THE STUDY OF THE DUST ENVELOPE OF AB AURIAGE
C. Catala *In* ESA 3rd European IUE Conf. Jun. 1982 p 107-111 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11905# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
THE VARIABLE SHELL STAR HR 5999. PART 7: THE EXTENDED ATMOSPHERE OF A HERBIG Ae STAR: CHROMOSPHERIC FEATURES
H. R. E. TjinADjie and P. S. The *In* ESA 3rd European IUE Conf. Jun. 1982 p 113-116 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11907# Armagh Observatory (Northern Ireland).
ROTATIONAL MODULATION OF CHROMOSPHERIC FEATURES

IN LATE-TYPE STARS
P. B. Byrne, C. J. Butler, A. D. Andrews, J. L. Linsky (Colorado Univ., Boulder), T. Simon (Colorada Univ., Boulder), N. Marstad (Colorado Univ., Boulder), M. Rodono (Catania Astrofisico Observatorio, Italy), C. Blanco (Catania Astrofisico Observatorio, Italy), S. Catalano (Catania Astrofisico Observatorio, Italy), and E. Marilli (Catania Astrofisico Observatorio, Italy) *In* ESA 3rd European IUE Conf. Jun. 1982 p 125-127 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11911# Queen Mary Coll., London (England). Dept. of Physics.
OUTER ATMOSPHERIC PROPERTIES OF BETA DRACONIS (G2 Ib-2)
A. Brown, C. Jordan (Oxford Univ.), T. R. Ayres (Lab. for Atmospheric and Space Science, Boulder, Colo.), J. L. Linsky (Joint Inst. for Lab. Astrophysics), and R. E. Stencel (Joint Inst. for Lab. Astrophysics) *In* ESA 3rd European IUE Conf. Jun. 1982 p 142-148 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11913# Universidad Complutense, Madrid (Spain). Dept. of Astrophysics.
THE TRANSITION REGION STRUCTURE OF SOLAR-LIKE STARS
M. J. Fernandez-Figueroa, E. deCastro, and M. Rego *In* ESA 3rd European IUE Conf. Jun. 1982 p 157-159 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11915# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
VARIABILITY OF COOL STARS AT OPTICAL AND ULTRAVIOLET WAVELENGTHS
J. L. Linski, P. L. Bornmann, M. Rodono (Catania Univ., Italy), V. Pazzani (Catania Univ., Italy), A. D. Andrews (Armagh Observatory, Northern Ireland), C. J. Butler (Armagh Observatory, Northern Ireland), and P. B. Byrne *In* ESA 3rd European IUE Conf. Jun. 1982 p 165-167 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11916# Manchester Univ. (England). Dept. of Astronomy.
STELLAR ACTIVITY IN THE SHORT PERIOD SUBGROUP OF THE RS CVn SYSTEMS
E. Budding and A. Gimenez (Univ. Complutense) *In* ESA 3rd European IUE Conf. Jun. 1982 p 169-173 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11922# Osservatorio Astronomico, Trieste (Italy).
SHORT-TIME SPECTRAL VARIATIONS OF THE OLD NOVA RR PIC
P. C. Selvelli *In* ESA 3rd European IUE Conf. Jun. 1982 p 197-199 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11926# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
STRONG UV EXCESS RADIATION IN CATACLYSMIC VARIABLES
W. Wargau, H. Drechsel, and J. Rahe *In* ESA 3rd European IUE Conf. Jun. 1982 p 215-218 refs (For primary document see N83-11889 02-88)
(Grant DFG-RA-136/10-1)
Avail: NTIS HC A99/MF A01

N83-11935# Observatoire de Paris (France).
THE INTERACTING BINARY KX AND
F. Paterson-Beeckmans, A. M. Hubert-Delplace, H. Hubert, and D. ballereau *In* ESA 3rd European IUE Conf. Jun. 1982 p 261-265 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11936*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE WC6 STAR HD76536 COMPACT COMPANION
G. E. Bromage (SRC, Chilton, England), W. M. Burton (Astronomical Inst., Utrecht, Netherlands), K. A. vanderHucht (ESTEC, Noordwidjk, Netherlands), F. Macchetto, and C. C. Wu *In* ESA 3rd European IUE Conf. Jun. 1982 p 269-271 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01 CSCL 03B

N83-11937# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
MASS LOSS FROM EXTREME HELIUM STARS
U. Heber, W.-R. Hamann, and D. Schoenberner *In* ESA 3rd European IUE Conf. Jun. 1982 p 273-276 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11939# Royal Observatory, Edinburgh (Scotland).
H-R DIAGRAM FOR EARLY TYPE MAGELLANIC CLOUD MEMBERS
K. Nandy, D. H. Morgan, G. I. Thompson, A. Willis (University Coll., London), R. Wilson (University Coll., London), and L. Houziaux (Liege Univ.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 281-282 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11942# Institut d'Astrophysique, Paris (France).
BEHAVIOR OF THE ENERGY DISTRIBUTION OF 59 CYG IN THE FAR ULTRAVIOLET AND IN THE VISIBLE
L. Divan and J. Zorec *In* ESA 3rd European IUE Conf. Jun. 1982 p 291-293 refs Prepared in cooperation with Coll. de France (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11945# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
ANALYSIS OF FIEGE 66, ANOTHER EXTREMELY SILICON-DEFICIENT OB SUBDWARF
B. Baschek, P. Hoeflich, and M. Scholz *In* ESA 3rd European IUE Conf. Jun. 1982 p 309-311 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11946# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
THE METALLICITY OF THE EXTREME HELIUM STAR BD + 10 DEG 2179
U. Heber *In* ESA 3rd European IUE Conf. Jun. 1982 p 313-316 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11947# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysique.
RADIATIVE TRANSFER CALCULATIONS FOR THE C 4 LAMBDA 155 mm RESONANCE LINES IN PLANETARY NEBULAE
J. Koeppen and R. Wehrse *In* ESA 3rd European IUE Conf. Jun. 1982 p 317-321 refs Sponsored by Deutsche Forschungsmeinschaft (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11949*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE UV STELLAR CLASSIFICATION PROGRAM
A. Heck, P. BenVenuti, L. Bianchi, J. Blades, C. Cacciari, A. Cassatella, A. Cucchiaro, D. Egret, C. Jaschek, M. Jaschek et al *In* ESA 3rd European IUE Conf. Jun. 1982 p 327-330 refs Prepared in cooperation with ESTEC, Madrid; Science Research Council, Chilton, England; Liege Univ., Belgium; Strasbourg Univ., France; and Royal Observatory, Edinburgh (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01 CSCL 03B

N83-11952# Hamburg Univ. (West Germany). Hamburger Sternwarte.
UV RESONANCE LINE FORMATION IN ZETA AUR/VV CEP SYSTEMS
K. Hempe and D. Reimers *In* ESA 3rd European IUE Conf. Jun. 1982 p 339-341 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11953# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
EVOLUTION OF THE SUBDWARF O ECLIPSING BINARY LB 3459
R. P. Kudritzki, K. P. Simon, A. E. Lynas-Gray (University Coll., London), D. Kilkenny (South African Astronomical Observatory, Cape Town), and P. W. Hill (St. Andrews Univ., Scotland) *In* ESA 3rd European IUE Conf. Jun. 1982 p 343-348 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11956# Hamburg Univ. (West Germany). Hamburger Sternwarte.
MASS LOSS RATE FROM IUE OBSERVATIONS OF ZETA AUR SYSTEMS
A. Che, K. Hempe, and D. Reimers *In* ESA 3rd European IUE Conf. Jun. 1982 p 355-357 refs (For primary document see N83-11889 02-88)
(Grants DFG-Re-353/7-1; DFG-Re-353/6-3; DFG-Re-353/6-4; DFG-Re-353/6-5)
Avail: NTIS HC A99/MF A01

N83-11957# Hamburg Univ. (West Germany). Hamburger Sternwarte.
SYSTEM APPARATUS AND MASS LOSS OF DELTA SGE
D. Reimers and K. P. Schroeder *In* ESA 3rd European IUE Conf. Jun. 1982 p 359-362 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11961# European Space Agency, Madrid (Spain). IUE Observatory.
DUST PROPERTIES IN STELLAR GROUPS
P. Patriarchi, M. Perinotto (Osservatorio Astrofisico di Arcetri, Florence), and B. Barsella (Pisa Univ., Italy) *In its* 3rd European IUE Conf. Jun. 1982 p 379-380 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11962# Science Research Council, Chilton (England). Rutherford Appleton Lab.
INTERSTELLAR EXTINCTION IN ANOMALOUS REGIONS
J. C. Blades, L. A. Jacobs (University Coll., London), D. McNally (University Coll., London), W. B. Somerville (University Coll., London), and D. C. B. Whittet (Preston Polytechnic) *In* ESA 3rd European IUE Conf. Jun. 1982 p 381-382 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11964# Kapteyn Astronomical Lab., Groningen (Netherlands).
INTERSTELLAR LINES IN HIGH RESOLUTION IUE SPECTRA. PART 2: HIGHLIGHTS OF PRELIMINARY ASTRONOMICAL RESULTS
D. P. Gilra, T. H. Pwa, and E. M. Arnal *In* ESA 3rd European IUE Conf. Jun. 1982 p 391-397 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11965# University Coll., London (England).
STUDIES OF INTERSTELLAR CO
W. B. Somerville, L. A. Jacobs, D. McNally, D. C. B. Whittet (Preston Polytechnic), and J. C. Blades (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 399-401 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11966# Queens Univ., Belfast (Northern Ireland).
HIGH VELOCITY GAS COMPONENTS ASSOCIATED WITH SUPERGIANT STARS AND INTERSTELLAR GAS
B. Bates, W. Brown-Kerr, and D. L. Giaretta (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 403-409 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11967# Science Research Council, Chilton (England). Rutherford Appleton Lab.
DEPLETION OF INTERSTELLAR ZINC
A. W. Harris, G. E. Bromage, and J. C. Blades *In* ESA 3rd European IUE Conf. Jun. 1982 p 411-413 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11968# University Coll., London (England). Dept. of Physics and Astronomy.
ELEMENT DEPLETIONS IN INTERSTELLAR GAS
A. P. Phillips, P. M. Gondhalekar (SRC, Chilton, England), and M. Pettini (Royal Greenwich Observatory, Hertsmonceaux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 415-420 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11969# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
THE MONOCEROS LOOP: A SUPERNOVA REMNANT INTERACTING WITH THE ROSETTE NEBULAE
Alfred Vidal-Madjar, C. Laurent, Max Pettini (Royal Greenwich Observatory), Jacques A. Paul (CEA, Sacaly, France), and M. Oliver (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 421-425 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11970# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
THE VIOLENT INTERSTELLAR MEDIUM ASSOCIATED WITH THE CARINA NEBULA
Claude Laurent, Jacques A. Paul (CEA, Saclay, France), and Max Pettini (Royal Greenwich Observatory) *In* ESA 3rd European IUE Conf. Jun. 1982 p 427-429 refs Document also announced as A82-42093 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11971# University Coll., London (England).
INTERSTALLAR GAS IN THE DIRECTION OF THE LARGE MAGELLANIC CLOUD
D. Maslen, A. J. Willis, R. Wilson, K. Nandy (Royal Observatory, Edinburgh), and J. C. Blades (SRC, Chilton, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 431-433 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11972# University Coll., London (England). Dept. of Physics and Astronomy.
HIGHLY IONIZED GAS IN THE GALACTIC HALO
Kym A. West and Max Pettini (Royal Greenwich Observatory, Hertsmonceaux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 435-437 refs Document also announced as N82-31220 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11973# Science Research Council, Chilton (England). Rutherford Appleton Lab.
DISTRIBUTION OF GAS IN THE HALO OF THE GALAXY
J. C. Blades, L. L. Cowie (MIT), D. C. Morton (Anglo-Australian Observatory), D. G. York (Princeton Univ.), and C-C. Wu (Computer Sciences Corp.) *In* ESA 3rd European IUE Conf. Jun. 1982 p 439-440 refs Document also announced as N82-31219 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11980# Osservatorio Astronomico, Trieste (Italy).
EXOTIC STELLAR OBJECTS: RESEARCH DIRECTIONS FOR THE PROPOSED SATELLITE MAGELLAN
M. Hack *In* ESA 3rd European IUE Conf. Jun. 1982 p 497-501 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11983# European Space Agency, Madrid (Spain). IUE Observatory.
OPTICAL AND ULTRAVIOLET SPECTROPHOTOMETRY OF GLOBULAR CLUSTERS IN THE MAGELLANIC CLOUDS
C. Cacciari, F. Fusi-Pecci (Bologna Univ.), C. Zavanori (Bologna Univ.), K. C. Freeman (Australian National Univ.), A. Cassatella, P. Benvenuti, L. Bianchi, A. Heck, P. Patriarchi, and W. Wamsteker *In its* 3rd European IUE Conf. Jun. 1982 p 519-522 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11989# European Southern Observatory, Munich (West Germany).
LINE PROFILES AND CONTINUUM RADIATION IN SEYFERT GALAXIES
C. Boisson and M. H. Ulrich *In* ESA 3rd European IUE Conf. Jun. 1982 p 549-550 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11990# University Coll., London (England). Dept. of Physics and Astronomy.
SECONDARY ULTRAVIOLET SOURCES IN THE SEYFERT 2 GALAXY NGC 1068
M. A. J. Snijders, S. A. Briggs, and A. Boksenberg (Royal Greenwich Observatory, Herstmonceux, England) *In* ESA 3rd European IUE Conf. Jun. 1982 p 551-557 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11992# European Space Agency, Madrid (Spain). Satellite Tracking Station.
MARKARIAN 108, A TIDALLY-TORN OFF OR TURNED ON GALAXY
P. Benvenuti, C. Casini (Milan Univ.), and J. Heidmann (Observatoire de Paris) *In its* 3rd European IUE Conf. Jun. 1982 p 565-567 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11995# New York Univ., New York. Dept. of Physics.
MULTIFREQUENCY OBSERVATIONS OF THE OPTICALLY VIOLENT VARIABLE QUASAR 1156 + 295
A. E. Glassgold, J. N. Bregman, and P. J. Huggins *In* ESA 3rd European IUE Conf. Jun. 1982 p 577-580 refs Document also announced as N82-31188 (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-12000# Vrije Universiteit, Brussels (Belgium). Inst. of Astrophysics.
STELLAR WINDS
C. DeLoore *In* ESA 3rd European IUE Conf. Jun. 1982 p 611-614 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N83-12006*# National Aeronautics and Space Administration, Washington, D. C.
ADVANCES IN PLANETARY GEOLOGY
Alex Woronow, ed. (Arizona Univ., Tucson) Sep. 1982 584 p refs
(NASA-TM-84894; EL-4; NAS 1.15:84894) Avail: NTIS HC A25/MF A01 CSCL 03B

Advances in Planetary Geology is a new series intended to serve the planetary geology community with a form for quick and thorough communications. There are no set lists of acceptable topics or formats, and submitted manuscripts will not undergo a formal review. All submissions should be in a camera ready form, preferably spaced, and submitted to the editor. For individual titles, see N83-12007 through N83-12030.

N83-12007*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION: INTRODUCTION Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 11-20 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

The relative ages of various geologic units and structures place tight constraints on the origin of the Moon and the planet Mercury, and thus provide a better understanding of the geologic histories of these bodies. Crater statistics, a reexamination of lunar geologic maps, and the compilation of a geologic map of a quarter of Mercury's surface based on plains units dated relative to crater degradation classes were used to determine relative ages. This provided the basis for deducing the origin of intercrater plains and their role in terrestrial planet evolution. L.F.M.

N83-12008*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. GEOLOGIC MAPPING OF MERCURY AND THE MOON Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 21-141 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

The geologic framework of the intercrater plains on Mercury and the Moon as determined through geologic mapping is presented. The strategies used in such mapping are discussed first. Then, because the degree of crater degradation is applied to both mapping and crater statistics, the correlation of degradation classification of lunar and Mercurian craters is thoroughly addressed. Different imaging systems can potentially affect this classification, and are therefore also discussed. The techniques used in mapping Mercury are discussed in Section 2, followed by presentation of the Geologic Map of Mercury in Section 3. Material units, structures, and relevant albedo and color data are discussed therein. Preliminary conclusions regarding plains' origins are given there. The last section presents the mapping analyses of the lunar intercrater plains, including tentative conclusions of their origin. L.F.M.

N83-12009*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. CRATERING HISTORIES OF THE INTERCRATER PLAINS Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 142-243 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

The intercrater plains of Mercury and the Moon are defined, in part, by their high densities of small craters. The crater size frequency statistics presented in this chapter may help constrain the relative ages and origins of these surfaces. To this end, the effects of common geologic processes on crater frequency statistics are compared with the diameter frequency distributions of the intercrater regions of the Moon and Mercury. Such analyses may determine whether secondary craters dominate the distribution at small diameters, and whether volcanic plains or ballistic deposits form the intercrater surface. Determining the mass frequency distribution and flux of the impacting population is a more difficult problem. The necessary information such as scaling relationships between projectile energy and crater diameter, the relative fluxes of solar system objects, and the absolute ages of surface units is model dependent and poorly constrained, especially for Mercury. Author

N83-12010*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. GEOLOGIC MAP ANALYSES: CORRELATION OF GEOLOGIC AND CRATERING HISTORIES Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 244-308 refs (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

Geologic map analyses are expanded, beginning with a discussion of particular regions which may illustrate volcanic and ballistic plains emplacement on Mercury. Major attention is focused on the surface history of Mercury through discussion of the areal distribution of plains and craters and the paleogeologic maps of the first quadrant. A summary of the lunar intercrater plains formation similarly interrelates the information from the Moon's geologic and cratering histories. Author

N83-12011*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. REMOTE SENSING AND PHYSICAL DATA AND THE MOON Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 309-322 refs (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

Imagery data from Mariner 10 and Lunar Orbiter IV form the major base of observations analyzed. But a variety of other information aids in constraining the composition and structure of the Moon and Mercury, and in particular, provides input to the problem of the nature and origin of their intercrater plains. This information for Mercury is remotely sensed from Earth or from the Mariner 10 spacecraft. Lunar data includes, of course, ground truth information from the Apollo landing sites. Since neither intercrater region was sampled, lunar and Mercurian data are similar in type and limitations. Constraints on surface and interior composition and structure are reviewed. Author

N83-12012*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. THERMAL HISTORIES OF MERCURY AND THE MOON Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 323-352 refs (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

To determine a planet's thermal history, a wide range of data is necessary. These data include remote sensing results, photogeologic evidence, magnetic field and remanent magnetization data, composition and ages of samples, and physical parameters of the planet and its orbit. Few of these data form unambiguous constraints for thermal models of Mercury. Igneous Chronology as the time history of the differentiation and igneous activity, is defined. Igneous Chronology is used here in the sense of the apparent igneous or relative chronology of geologic events, such as plains formation (through whatever mechanism) relative to the crater production and tectonic history (lineament and scarp formation). Author

N83-12013*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. DISCUSSION OF THE NATURE, ORIGIN AND ROLE OF THE INTERCRATER PLAINS OF MERCURY AND THE MOON Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 353-382 refs (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

The nature and origin of the intercrater plains of Mercury and the Moon as determined through geologic mapping, crater statistics, and remotely sensed data are summarized. Implications of these results regarding scarp formation, absolute ages, and terrestrial planet surfaces are included. The role of the intercrater plains is defined and future work which might lead to a better understanding of these units and terrestrial planet evolution is outlined. Author

N83-12014*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. DESCRIPTION OF UNITS TO ACCOMPANY THE GEOLOGIC TERRAIN MAP OF MERCURY'S FIRST QUADRANT Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 383-389 (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

Descriptions and interpretations of surface features are provided to accompany the geologic terrain map of Mercury's first quadrant. N.W.

N83-12015*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. AREAL MEASUREMENT OF MERCURY'S FIRST QUADRANT Ph.D. Thesis

Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 390-399 refs (For primary document see N83-12006 02-91)

(Grant NsG-7146)

Avail: NTIS HC A25/MF A01 CSCL 03B

Various linear and areal measurements of Mercury's first quadrant which were used in geological map preparation, map analysis, and statistical surveys of crater densities are discussed. Accuracy of each method rests on the determination of the scale of the photograph, i.e., the conversion factor between distances on the planet (in km) and distances on the photograph (in cm). Measurement errors arise due to uncertainty in Mercury's radius, poor resolution, poor coverage, high Sun angle illumination in the limb regions, planetary curvature, limited precision in measuring instruments, and inaccuracies in the printed map scales. Estimates are given for these errors. Author

N83-12016*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. MEASUREMENT AND ERRORS OF CRATER STATISTICS Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 400-412 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

Planetary imagery techniques, errors in measurement or degradation assignment, and statistical formulas are presented with respect to cratering data. Base map photograph preparation, measurement of crater diameters and sampled area, and instruments used are discussed. Possible uncertainties, such as Sun angle, scale factors, degradation classification, and biases in crater recognition are discussed. The mathematical formulas used in crater statistics are presented. Author

N83-12017*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. CRATER STATISTICAL DATA Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 413-470 (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

The total number of craters within a bin of mean diameter, and the number of craters of each degradational type within that bin are tabulated. Rim-to-rim diameters were measured at arbitrary azimuths for rectified photos or photos taken at vertical incidence (most lunar photos), and at azimuths paralleling a local tangent to the limb for oblique images. Author

N83-12018*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. ESTIMATED THICKNESS OF EJECTA DEPOSITS COMPARED TO TO CRATER RIM HEIGHTS Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 471-474 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

The area of the continuous ejecta deposits on mercury was calculated to vary from 2.24 to 0.64 times the crater's area for those of diameter 40 km to 300 km. Because crater boundaries on the geologic map include the detectable continuous ejecta blanket, plains exterior to these deposits must consist of farther-flung ejecta (of that or other craters), or volcanic deposits flooding the intervening areas. Ejecta models are explored. Author

N83-12019*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. CONSTUCTION OF THE PALEOGEOLOGIC MAPS Ph.D. Thesis
Martha Alan Leake *In* NASA, Washinghton Advan. in Planetary Geol. Sep. 1982 p 475-476 (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

The Post Caoris surface was derived from the geologic map by plotting all Class 1 and 2 features. To construct the Caloris surface, Class 3 craters were plotted onto the map, as well as all Class 3 plains. However, if P3 plains were adjacent to P2 units, and appeared continuous with other exposures of P3 material, the P2 unit was assumed to overlie the C3 and P3 material. The younger superposed craters were ignored with respect to the Class 3 surface. The boundaries of P3 materials were then continued under the superposed units, using a minimum of reasonable assumptions. For instance, if P2 and P4 plains were adjacent units, no P3 plains were presumed to lie under the P2 material. Similarly, all C3 craters were considered to have some deposits of impact melt after formation, even if they are mapped containing younger units. C3 craters which were superposed with younger units, C1 or C2 craters, and perhaps P2 plains, were redrawn as if later materials had not been emplaced, i.e., in their post impact, pre-degradation states. Author

N83-12020*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. THERMAL MODELS OF MERCURY Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 477-488 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

Recent and more complex thermal models of Mercury and the terrestrial planets are discussed or noted. These models isolate a particular aspect of the planet's thermal history in an attempt to understand that parameter. Among these topics are thermal conductivity, convection, radiogenic sources of heat, other heat sources, and the problem of the molten core and regenerative dynamo. A.R.H.

N83-12021*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. ALTERNATIVE THERMAL HISTORIES Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 489-498 (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

Interpretations supporting a differentiated, once active Mercury are listed. Alternative scenarios of the planet's thermal history involve: different distributions of accreted materials, including uranium and thorium-rich materials; variations of early melting; and different modes of plains and scarp formation. Arguments are advanced which strongly favor plains formation by volcanism, lack of a primordial surface, and possible identification of remnant tensional features. Studies of remotely sensed data which strongly suggest a modestly homogeneous surface of silicates imply core separation. Reasons for accepting or rejecting various hypotheses for thermal histories of the planet are mentioned. A.R.H.

N83-12022*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. CHRONOLOGY OF SURFACE HISTORY OF MERCURY Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 499-504 refs (For primary document see N83-12006 02-91)
(Grant NsG-7146)
Avail: NTIS HC A25/MF A01 CSCL 03B

Phases in the history of the planet Mercury include: (1) condensation and accretion; (2) heating; (3) planetary expansion during heavy bombardment; (4) tidal spin-down and lineament formation; (5) P5 plains emplacement; (6) P4 plains emplacement; (7) peak planetary volume in P3 period; (8) scarp formation; (9) Caloris Basin formation, late class 3; (10) scarp formation and P2 plains formation; (11) smooth plains formation in and around large basins; (12) late or local tectonic stress; and (13) quiescent class 1 period. Although the cooling and contraction of the lithosphere are complete, the core remains molten as an active

dynamo, producing the magnetic fields detected by Mariner 10. Plains produced since core formation (P3 to P-1) should record its magnetic activity. Cratering during the Class 2 and Class 1 periods is probably not enough to distribute ballistic materials and homogenize any color differences. A.R.H.

N83-12023*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
THE INTERCRATER PLAINS OF MERCURY AND THE MOON: THEIR NATURE, ORIGIN AND ROLE IN TERRESTRIAL PLANET EVOLUTION. CHRONOLOGY OF SURFACE HISTORY OF THE MOON Ph.D. Thesis
Martha Alan Leake *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 505-507 refs (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The sequence of events is described that occurred from the time that the ancient lunar crust solidified (about 4.4. billion years ago) and anorthositic high lands dominated the surface, until the global contraction (cooling) that began around 3.3 billion years ago when late stage basalts were emplaced at basin margins where fractures penetrated to subsurface tensional zones. The lunar intercrater plains may be linked with early KREEP volcanism, the LKFM basalt source region, and the first stages of mare volcanism. Ages of KREEP bracket the possible ages of the pre-Imbrian plains, and overlap the initial stages of mare basalt emplacement. Both plains are extruded under the same tensional tectonic regime. A.R.H.

N83-12024*# California Univ., Davis. Dept. of Geology.
PLANET-CROSSING ASTEROID SURVEY
Carlos A. Atallah *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 541-544 Sponsored by JPL (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

Ephemerides computed from asteroid orbits and the 48 in. Palomar Schmidt log book were used to determine the number of objects that might have appeared in photographic plates taken in years other than 1979. Thus, new positions would be calculated aiding the refinement of the preliminary orbits of these asteroids, eventually leading to their permanent number of designation. From these 109 asteroids, 35 were potentially on 97 plates taken at Palomar between 1976 and 1981. Unfortunately, only 27 plates were readily available and the number of tentative asteroids was reduced to 10. Upon examination of the film, only six objects were found to be in the region predicted by their ephemerides. The position of these objects was measured to the one arcsecond precision. A.R.H.

N83-12025*# State Univ. of New York, Buffalo. Dept. of Natural Sciences and Mathematics.
POSSIBLE APPLICATIONS OF TIME DOMAIN REFLECTOMETRY IN PLANETARY EXPLORATION MISSIONS
Steve Heckendorn *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 545-555 refs (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The use of a time domain reflectometer (TDR) for planetary exploration is considered. Determination of the apparent dielectric constant and hence, the volumetric water content of frozen and unfrozen soils using the TDR is described. Earth-based tests were performed on a New York state sandy soil and a Wyoming Bentonite. Use of both a cylindrical coaxial transmission line and a parallel transmission line as probes was evaluated. The water content of the soils was varied and the apparent dielectric constant measured in both frozen and unfrozen states. Advantages and disadvantages of the technique are discussed. J.D.

N83-12026*# Massachusetts Univ., Amherst.
ASSESSING THE VOLCANIC PROBABILITY OF MARTIAN LANDFORMS
Maureen OToole *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 556-558 Sponsored by Geological Survey (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

A table for use in identifying Martian land forms that may be volcanic in nature is presented. Eight types of known volcanic features and associations are described and each assigned a point value based on the degree to which it is thought to be characteristic of volcanoes. The system is applied to four well known Martian volcanoes and to other Martian features which may or may not be volcanic in origin. J.D.

N83-12027*# James Madison Univ., Harrisonburg, Va.
THE EFFECTS OF VARYING SURFACE ROUGHNESS ON AERODYNAMIC AND AEOLIAN PROCESSSES
Lynn M. Reding *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 P 559-564 refs Sponsored by NASA. Ames Research Center (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The investigation of aeolian processes on Earth and Mars using wind tunnel simulations is described. The effect of variations in surface roughness on aerodynamic and aeolian processes was examined. Friction velocity ratios, wind friction threshold speeds, particle flux, and total flux were determined for various sand depths, degrees of surface roughness, and heights above a pebble bed. J.D.

N83-12028*# University of Western Washington, Bellingham.
MORPHOLOGY OF VOLCANOES
Henry J. Schuver *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 565-568 refs Sponsored by NASA. Johnson Space Center (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The effects of chemical composition of the lava, physical processes of volcanic formation, and lava flow lengths on the morphology of Earth volcanoes were investigated. Difficulties in investigating volcanic morphology are discussed. J.D.

N83-12029*# Hunter Coll., New York.
TWO METHODS FOR DETERMINING VOLUMES FOR EXPLOSION AND IMPACT CRATERS
Alejo N. Verdes *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 568-573 ref Sponsored by Geological Survey (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The development and testing of two techniques for determination of apparent and rim crest volumes of impact and explosion craters are described. The accuracy of the techniques, their relative costs, and the time required to complete the volume calculations are compared. J.D.

N83-12030*# Franklin and Marshall Coll., Lancaster, Pa.
EJECTA DISTRIBUTION AROUND A SMALL LUNAR CRATER
Stephen J. Wetzel *In* NASA, Washington Advan. in Planetary Geol. Sep. 1982 p 574-578 refs (For primary document see N83-12006 02-91)
Avail: NTIS HC A25/MF A01 CSCL 03B

The ejecta deposit surrounding a one-half kilometer lunar crater was examined in search of a pattern to its distribution. Data reduction methods are described. Size and range frequency plots for the ejecta were generated. J.D.

N83-12031*# Arizona Univ., Tucson. Lunar and Planetary Lab.
NASA CATALOGUE OF LUNAR NOMENCLATURE
Leif A. Andersson and Ewen A. Whitaker Washington Oct. 1982 172 p
(Grant NGL-03-002-191)
(NASA-RP-1097; NAS 1.61:1097) Avail: NTIS HC A08/MF A01 CSCL 03B

Lunar nomenclature is cataloged. It includes letter designations for subsidiary craters, and uses a more familiar spelling from eight names. The listed features are divided into three main groups for cataloging purposes, namely: (1) craters, (2) noncrater features; and (3) minor and miscellaneous features. S.L.

N83-12032*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
OUTER SATELLITE ATMOSPHERES: THEIR NATURE AND PLANETARY INTERACTIONS Annual Report, 15 Mar. 1980 - 31 May 1981
William H. Smyth Jul. 1981 134 p refs
(Contract NASw-3387)
(NASA-CR-169437; NAS 1.26:169437; Rept-4) Avail: NTIS HC A07/MF A01 CSCL 03B

Modeling capabilities and initial model calculations are reported for the peculiar directional features of the Io sodium cloud discovered by Pilcher and the extended atomic oxygen atmosphere of Io discovered by Brown. Model results explaining the directional feature by a localized emission from the satellite are encouraging, but as yet, inconclusive; whereas for the oxygen cloud, an escape rate of 1 to 2 x 10 to the 27th power atoms/sec or higher from Io is suggested. Preliminary modeling efforts were also initiated for the extended hydrogen ring-atmosphere of Saturn detected by the Voyager spacecraft and for possible extended atmospheres of some of the smaller satellites located in the E-ring. Continuing research efforts reported for the Io sodium cloud include further refinement in the modeling of the east-west asymmetry data, the asymmetric line profile shape, and the intersection of the cloud with the Io plasma torus. In addition, the completed pre-Voyager modeling of Titan's hydrogen torus is included and the near completed model development for the extended atmosphere of comets is discussed. M.G.

N83-11974*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE SPECTRUM OF COMETS AS DERIVED FROM IUE OBSERVATIONS
M. C. Festou (CNRS, Verrieres-le-Buisson, France), P. D. Feldman (John Hopkins Univ., Baltimore), H. A. Weaver, and H. U. Keller (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* ESA 3rd European IUE Conf. Jun. 1982 p 445-449 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11975# University Coll., Cardiff (Wales). Dept. of Applied Mathematics and Astronomy.
COMETS MADE OF H2O ICE
Max K. Wallis *In* ESA 3rd European IUE Conf. Jun. 1982 p 451-453 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11976# Bonn Univ. (West Germany). Physikalisches Inst.
AMMONIA IN THE JOVIAN STRATOSPHERE: A COMPARISON OF PHOTOCHEMICAL CALCULATIONS WITH IUE OBSERVATIONS
K. H. Fricke, U. vonZahn, M. Combes (Observatoire de Meudon, France), and T. Encrenaz (Observatoire de Meudon, France) *In* ESA 3rd European IUE Conf. Jun. 1982 p 455-461 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

N83-11977# Bonn Univ. (West Germany). Physikalisches Inst.
OBSERVATION OF THE LYMAN-ALPHA ALBEDO OF URANUS
K. H. Fricke and J. Darius (Science Museum, London) *In* ESA 3rd European IUE Conf. Jun. 1982 p 463-469 refs (For primary document see N83-11889 02-88)
Avail: NTIS HC A99/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-12033*# Hawaii Univ., Honolulu.
THE MODELING OF THE SOLAR UPPER PHOTOSPHERE AND LOWER CHROMOSPHERE BASED UPON ATM DATA
James N. Heasley 1982 5 p refs
(Contract NAS8-33219)
(NASA-CR-170641; NAS 1.26:170641) Avail: NTIS HC A02/MF A01 CSCL 03B

The use of the solar H I Lyman spectral line as a diagnostic of the lower to middle chromosphere is discussed. Quiet sun Lyman profiles from the photographic spectra were subjected to data reduction and appropriate theoretical modelling was accomplished. Apollo telescope mount data was utilized. R.J.F.

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N83-12034# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GAMMA RAY MEASUREMENTS BETWEEN 0.3 MeV AND 3 MeV OF THE 0.511 MeV ANNIHILATION LINE IN THE REGION OF THE GALACTIC CENTER M.S. Thesis [MEDIDAS DE RAIOS GAMA ENTRE 0,3 E 3 MEV E DA LINHA DE ANIQUILACAO O,511 MEV NA REGIAO DO CENTRO GALATICO]
Maria Virginia Alves Jardim Apr. 1982 69 p refs In PORTUGUESE; ENGLISH summary
(INPE-2371-TDL/08) Avail: NTIS HC A04/MF A01

Measurements of the annihilation line flux intensity at 0.511 MeV, obtained with a balloon borne experiment to measure gamma rays in the energy interval 0.3 to 3 MeV are presented. The detector looked at the galactic disk in the longitude interval -31 deg < (1 sup II) <-41 deg and observed a flux intensity of (6.70 + or - 0.85) x .001 photons cm/2/s, which is in good agreement with the flux value estimated assuming that the Galactic Center is a line source emitting uniformly. Some likely sources of positrons and annhilation regions are also discussed. The results for the continuum spectrum emitted from the Galactic Center in the energy interval 0.3 to 0.67 MeV are presented and compared with measurements made by other authors. A.R.H.

N83-12035# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MEASUREMENTS OF THE LOW-ENERGY GAMMA RAY CONTINUUM EMISSION FROM THE GALACTIC CENTER DIRECTION
Maria Virginia Alves Jardim, Inacio Malmonge Martin, and Jeronimo Osvaldo Dias Jardim Jul. 1982 13 p refs In PORTUGUESE; ENGLISH summary Sponsored by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-2493-PRE/167) Avail: NTIS HC A02/MF A01

Using the data obtained with a balloon-borne gamma-ray telescope to measure gamma-rays in the energy interval between 0.3 and 3 MeV, two points for the continuum spectrum in the range between 0.34 and 0.67 MeV were calculated. The power law spectrum suggests that the main component for the gamma-ray continuum emission below 10 MeV is dominated by the bremsstrahlung due to relativistic electrons. Author

N83-12036*# Kiel Univ. (West Germany). Inst. fuer Reine und Angewandte Kernphysik.
DATA PROCESSING FOR A COSMIC RAY EXPERIMENT ONBOARD THE SOLAR PROBES HELIOS 1 AND 2: EXPERIMENT 6 Final Report, Oct. 1981
Reinhold Mueller-Mellin, Guenter Green, Bernd Iwers, Horst Kunow, Gerd Wibberenz, Joachim Fuckner, Horst Hempe, and Manfred Witte Bonn Bundesministerium fuer Forschung und Technologie Jul. 1982 154 p refs In GERMAN; ENGLISH summary Sponsored by NASA and Bundesministerium fuer Forschung und Technologie
(NASA-CR-169459; NAS 1.26:169459; BMFT-FB-W-82-009; ISSN-0170-1339) Avail: NTIS HC A08/MF A01; Fachinformation-

szentrum, Karlsruhe, West Germany DM 32,50

The data processing system for the Helios experiment 6, measuring energetic charged particles of solar, planetary and galactic origin in the inner solar system, is described. The aim of this experiment is to extend knowledge on origin and propagation of cosmic rays. The different programs for data reduction, analysis, presentation, and scientific evaluation are described as well as hardware and software of the data processing equipment. A chronological presentation of the data processing operation is given. Procedures and methods for data analysis which were developed can be used with minor modifications for analysis of other space research experiments. Author (ESA)

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Contents: Remote Sensing Research, Visible and Infrared Satellite Remote Sensing - A Status Report, Outbreaks of Polar Continental Air: Windows on the Mesoscale Structure of the Upper Ocean, Surface Wave Modulation Patterns in Radar Images, and Three Dimensional Representation of Clouds from Satellite Images. GRA

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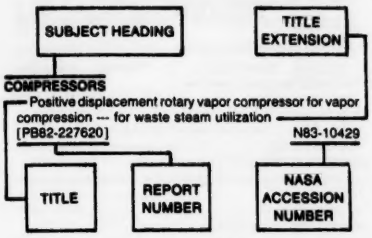

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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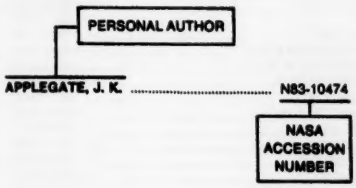

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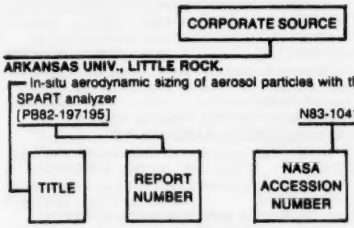

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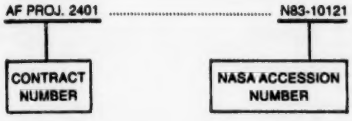

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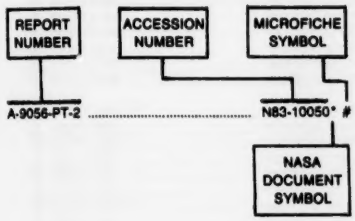

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